TM 11-6230-219-35

TECHNICAL MANUAL

DS, GS, AND DEPOT MAINTENANCE MANUAL

SEARCHLIGHTS, VISIBLE LIGHT-INFRARED AN/GSS-14, AN/GSS-14A, AN/GSS-14B, AN/GSS-18, AN/GSS-18A, AN/GSS-18B, AN/VSS-1, AN/VSS-1A, AN/VSS-1B, AN/VSS-1C, AN/VSS-1D, AN/VSS-1E, AND SEARCHLIGHT SET, INFRARED AN/VSS-2

This copy is a reprint which includes current pages from Change 1.

HEADQUARTERS, DEPARTMENT OF THE ARMY
JULY 1970

WARNING

Do nct turn off the main power switch
until the blower has stopped.

WARNING

Do not look directly into the searchlight
when it is in operation.

The high, intense, visible or
infrared light may cause blindness.

WARNING

Do not operate the searchlight
in the narrow beam visible mode
while personnel are within
200 meters of the beam path.

WARNING

Personnel may suffer temporary flash blindness
at ranges in excess of 200 meters
when the searchlight is operated in either the
narrow beam or wide beam visible mode.

WARNING

Be extremely careful in handling
the high-pressure xenon lamp.

Avoid touching the quartz envelope
of the xenon lamp.

TECHNICAL MANUAL
No. 11–6230–219–35

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *2 July 1970*

DS, GS, AND DEPOT MAINTENANCE MANUAL

SEARCHLIGHTS, VISIBLE LIGHT-INFRARED AN/GSS–14, AN/GSS–14A, AN/GSS–14B, AN/GSS–18, AN/GSS–18A, AN/GSS–18B, AN/VSS–1, AN/VSS–1A, AN/VSS–1B, AN/VSS–1C, AN/VSS–1E, AND SEARCHLIGHT SET, INFRARED AN/VSS–2

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CHAPTER 1

INTRODUCTION

1–1. Scope

a. This manual describes the 2.2-kw, 23-inch xenon searchlight (searchlight) and covers field and depot maintenance procedures. The manual covers equipment functioning (chapter 2); direct support troubleshooting, adjustment, repair, removal and replacement, and testing procedures (chapter 3); general support maintenance procedures beyond the scope and capabilities of direct support (chapter 4); and depot overhaul standards (chapter 5). Foldout illustrations are located in chapter 6.

b. The complete technical manual for this equipment includes TM 11—6230—219—12.

c. Official nomenclature followed by (*) is used to indicate all models of the equipment item covered in this manual. Refer to TM 11—6230—219—12 for a detailed explanation.

1–2. Indexes of Publications

a. DA Pam 310—4. Refer to the latest issue of DA Pam 310—4 to determine whether there are new additions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310—7. Refer to DA Pam 310—7 to determine whether there are any modification work orders (MWO's) pertaining to the equipment. Department of the Army Pamphlet No. 310—7 lists all Department of the Army MWO's, identifying the type, model, series, and federal stock number of the item to be modified; number, date, and classification of the MWO; category of maintenance authorized to perform the modification, and man-hours required to modify each item.

NOTE

Applicable forms and records are covered in TM 11—6230—219—12.

1–3. Reporting of Equipment Manual Improvements

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-MA-S, Fort Monmouth, N.J. 07703.

1–4. Reference Designations

Reference designations consist of groups of letters and numbers that identify assemblies, subassemblies, and parts. Each reference designation used throughout this manual on applicable illustrations and in the text to identify a particular item is also used in appendix B (DS, GS, and Depot Repair Parts) to identify the same item. Each assembly within the searchlight is assigned an identifying number. The number is the reference designation of the assembly. Following is a list of reference designations assigned to major assemblies of the searchlight.

Assembly	*Reference designation*
Cover assembly, outer front	1
Shockmount assembly	2
Cowling, glass assembly	3
Harness assembly (motor drive and switch)	4
Switch assembly	5
Housing assembly	6
Lamp and container assembly	7
Cable assembly (igniter to lamp)	8
Reflector assembly, primary	9
Adjustment assembly, reflector	10
Screen and guard assembly	11
Wiring harness (igniter to converter)	12
Heat exchanger and blower assembly	13
Igniter assembly	14
Relay Assembly Varo Model 9922	15
Converter Assembly Varo Model 9948	16
Housing assembly	17
Cable assembly (tank to searchlight)	18

Assembly	Reference designation
Mount, Universal MT–3900/GSS–14	19
Power cable (jeep mount assembly)	20
Control boxes	21-25
Mode SELECTOR SWITCH	21
Access cover	22
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1–5. Differences in Models

Internal differences are listed below. For external differences and other internal differences see TM 11–6230–219–12.

a. Converter Assembly.

Item	Varo model 9912 (para 2–15)	Varo model 9924 (para 2–17)	Melpar model F50001 (para 2–15)	Varo model 9948 (para 2–17)	ITT model 6484 (para 2–16)
Reference designation	39	40	41	16	38
Used on	AN/VSS–1, –1A	AN/VSS–1B	AN/VSS–1C	AN/GSS–14, –14A, AN/VSS–1D, AN/VSS–2, AN/GSS–18, AN/GSS–18A	AN/GGS–14B, AN/VSS–1E, AN/GSS–18B
Interchangeable	Yes	Yes	Yes	Yes	Yes
Changes reqd	None	None	None	None	None

Note. When Varo models 9912, 9924, and 9948, or Melpar model F50001 become unrepairable and replacement converter assemblies of these models are unavailable, ITT model 6484 will replace them.

b. Igniter Assembly.

Item	Varo model 9911 (para 2–18)	Melpar model F50006 (para 2–18)
Reference designation	14	14
Identical to	Melpar model F50006	Varo model 9911
Used on	All models except AN/VSS–1C	AN/VSS–1C
Interchangeable	Yes	Yes
Changes required	None	None

c. Relay Panel Assembly.

Item	Varo model 9913 (para 2–20)	Varo model 9922 (para 2–21)	Melpar model F40015 (para 2–21)
Reference designation	42	15	43
Identical to		Melpar model F40015	Varo model 9922
Used on	AN/VSS–1	AN/VSS–1A, –1B, –1D, AN/VSS–2, AN/GSS–14 (*), AN/GSS–18(*)	AN/VSS–1C
Interchangeable	No		Replace with Varo model 9922
Changes required		None	Refer to (para 3–21)
Main differences	Replaceable relays	Printed circuit	Printed circuit

d. Control Box.

Item	*C–7163/VSS–1*	*C–7164/GSS–14*
Reference designations	21, 22, 23, 24, 25	21, 22, 23, 24, 25
Used on	AN/VSS–1(*), AN/VSS–2	AN/GSS–14(*), AN/GSS–18(*)
Interchangeable	No	No
Main power switch	Located in tank	S3 in control box
Main power relay	Located in tank	K5 in control box
Override switch	None	S4 located on control box

e. Mount.

Item	*Shockmount Assembly*	*MT–3900/GSS–14 (para 2–25)*	*MT–3900A/GSS–14 (para 2–24)*
Reference designation	2	19	44
Used on	AN/VSS–1(*), AN/VSS–2	AN/GSS–14, AN/GSS–18	AN/GSS–14A, –14B AN/GSS–18A, –18B
Interchangeable	No	Yes	Yes
Azimuth positioning	Moves with tank turret	Manually	Azimuth handwheel
Elevation positioning	Moves with gun barrel	Manually	Elevation handwheel
Cabling	None	Cable harness routed from power supply direct to control box	Cable harness routed from power supply through universal mount (A) to control box
Installation		TM 11–2300–351–15–3	

f. Interconnecting Cables.

(1) *AN/VSS–1(*) and AN/VSS–2.* The tank-mounted searchlights use Cable Assembly, Power, Electrical CX–10729/VSS–1 (reference designation 18) to connect the searchlight subassembly to the tank turret. Additional cables (not supplied with the searchlight) within the tank turret are used to complete the connection of the tank searchlight subassembly to the tank control box and input power.

(2) *AN/GSS–14(*) and AN/GSS–18(*).* The universal-mounted searchlights do not require interconnecting cables because the control box is directly connected to the input power receptacle at the rear of the universal searchlight subassembly. Cable Assembly, Power, Electrical CX–10729/VSS–1 (reference designation 20) is used to connect the 1/4-ton vehicle power supply to the control box. Refer to TM 11–6230–219–12 for detailed cable discussion and information.

CHAPTER 2

FUNCTION OF EQUIPMENT

Section I. BLOCK DIAGRAM DESCRIPTION

2-1. General

The searchlight is mounted on tanks, trucks, or towers. All models of the AN/VSS—1(*) and AN/VSS—2 are designed for tank mounting; the AN/GSS—14(*) and AN/GSS—18(*) are designed for truck or tower mounting. Although each searchlight type varies (because of the type of mount or control box used), each type operates on the same principle. Differences in models are pointed out in the text where applicable.

2-2. Power Source
(fig. 2—1)

a. From the external power source +28 volts dc is supplied to the control box. The AN/GSS—14(*) and AN/GSS—18(*) are supplied from the vehicular power source (vehicular mount) or from the appropriate power unit (tower mount). The AN/VSS—1(*) and AN/VSS—2 receive power from the tank power source. The electrical power requirements for the searchlight are in three forms of 28VDCL: B+, auxiliary B+ (aux B+), and mode control voltages. The applications of the three voltages are as follows:

(1) The B+ voltage is used for ignition and illumination of the xenon lamp. It is also the primary power source for operation of the blower motor. B+ is applied to the ignition and illumination circuits and blower motor circuits only after the SEARCHLIGHT power switch on the control box is set to STANDBY or ON.

(2) Auxiliary B+ (aux B+) voltage is used to activate the mode control circuits (para 2—22) and the 3-second shutdown circuit in the ignition and illumination circuits (para 2—19 *a*). It is also a secondary source of operation of the blower motor. The aux B+ is distributed only when the main power switch is set to ON.

(3) Mode control voltages (28 volts dc) are used to operate the main power relay for operation of the xenon lamp, blower motor, and the mode control relays in the relay panel assembly for controlling the searchlight mode of operation. The mode control voltages are distributed from the SEARCHLIGHT power switch and the mode SELECTOR SWITCH only when the control box SEARCHLIGHT power switch is set to STANDBY or ON.

b. The differences in the location of the main power switch and main power relay in the AN/VSS—1(*), AN/VSS—2, and the AN/GSS—14(*), and the AN/GSS—18(*) are given below.

(1) *AN/VSS—1(*) and AN/VSS—2.* The main power switch and main power relay are within the tank turret and are not part of the searchlight. However, because both components are necessary for searchlight operation, they are illustrated and discussed herein. The searchlight repairman is not responsible for the maintenance and repair of these components; but should these components malfunction, the searchlight repairman is responsible to isolate these components as the problem areas and report his findings to vehicular maintenance personnel.

(2) *AN/GSS—14(*) and AN/GSS—18(*).* The main power switch and main power relay, located in the universal control box, are part of the searchlight.

2-3. Control Box

The control box has two main switches: the SEARCHLIGHT power switch and the mode SELECTOR SWITCH. In addition, the AN/GSS—14(*) and AN/GSS—18(*) control boxes have an emergency override switch and a main power switch. These switches function as follows:

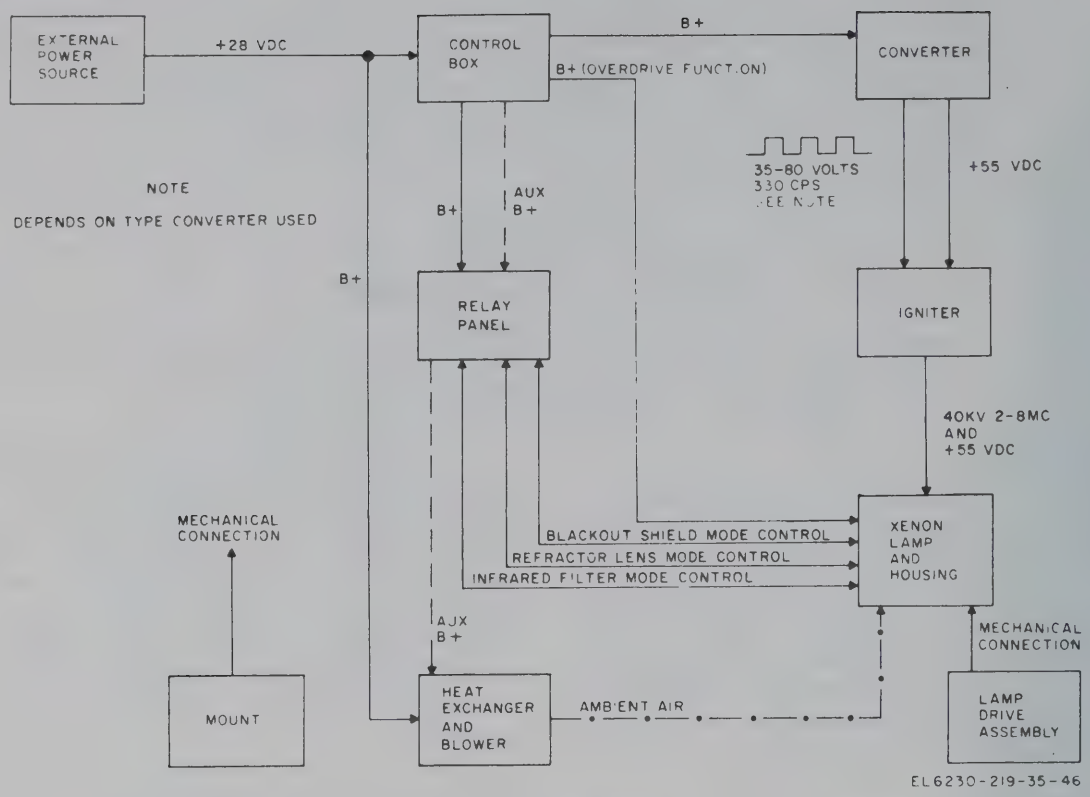


Figure 2—1. 2.2-kw, 23-inch xenon searchlight, overall block diagram.

a. SEARCHLIGHT Power Switch. This switch has three positions: OFF, STANDBY, and ON.

(1) When the switch is set to OFF, the searchlight is inoperative. The xenon lamp is not illuminated, the blower motor remains inoperative, and the mode SELECTOR SWITCH is ineffective (except for the overdrive circuit).

(2) When the switch is set to STANDBY, the blower motor operates, the xenon lamp illuminates, and the mode SELECTOR SWITCH can be used to operate the searchlight in the infrared (IR) or visible mode of operation. However, the searchlight will not emit light so long as the switch is in the STANDBY position. This is because the metal blackout shield remains in its normal position and blacks out light produced by the xenon lamp (E, fig. 2—2).

(3) When the switch is set to ON, IR or visible light emits from the searchlight in the mode controlled by the mode SELECTOR SWITCH, because unless the switch is placed at BO, the metal blackout shield moves from its normal position in front of the xenon lamp to a position behind the xenon lamp.

NOTE

The front of the xenon lamp is the side closest to the primary reflector. The rear of the xenon lamp is the side farthest away from the primary reflector (fig. 2—2).

b. Mode SELECTOR SWITCH. This switch causes the searchlight to emit a narrow or wide beam of infrared or visible light, increase the light intensity, or black out the light. It has six positions: IR FOCUS, IR WIDE, BO, VIS WIDE, VIS FOCUS, and OVERDRIVE.

NOTE

Searchlight Set, Infrared AN/VSS—2 is identical with the AN/VSS—ID, and the AN/GSS—18(*) identical to the AN/GSS—14(*), except that they contain a pink filter instead of an infrared (IR) filter to obtain infrared light. For coverage of the AN/VSS—2 and AN/GSS—18(*) in the text and illustrations, substitute the infrared (IR) filter with the pink filter.

(1) When the switch is set to IR FOCUS, the IR filter and refractor lens remain in the normal positions and the metal blackout shield is moved

behind the xenon lamp (C, fig. 2—2). The searchlight emits a focused beam of IR light.

(2) When the switch is set to IR WIDE, the IR filter remains in its normal position, the metal blackout shield is moved behind the xenon lamp, and the refractor lens is moved to the front of the xenon lamp (D, fig. 2—2). The searchlight emits a wide beam of IR light.

(3) When the switch is set to BO, the IR filter, metal blackout (BO) shield, and refractor lens remain in their normal positions (E, fig. 2—2). The searchlight is blacked out.

(4) When the switch is set to VIS WIDE, the IR filter and the metal blackout shield are moved behind the xenon lamp and the refractor lens is moved to the front of the xenon lamp (B, fig. 2—2). The searchlight emits a wide beam of visible light.

(5) When the switch is set to VIS FOCUS, the IR filter and the metal blackout shield are moved behind the xenon lamp (A, fig. 2—2). The searchlight emits a focused beam of visible light.

(6) The overdrive mode of operation is started by momentarily pulling the control knob of the mode SELECTOR SWITCH. This action closes a switch that connects the normally open overdrive circuit to ground. The overdrive circuit operates and the control box indicator light illuminates. Releasing the control knob of the mode SELECTOR SWITCH does not open the overdrive ground circuit. When the overdrive circuit is initially turned on, it temporarily connects the overdrive ground circuit to an alternate ground. However, after a preset period, the overdrive time-delay circuit opens the alternate ground connection for the overdrive circuit and shuts itself off. This action causes the intensity of light emitted by the searchlight to decrease to normal and the indicator light to shut off.

c. Emergency Override Switch. When the AN/GSS—14(*) or the AN/GSS—18(*) is mounted on a vehicle, an automatic cutoff circuit is added to the searchlight. It consists of an oil pressure switch located on the vehicle, and an emergency override switch located on the control box. This circuit performs two functions:

(1) It protects the battery system of the vehicle from damage due to high current drain by shutting off the xenon lamp when the vehicle engine develops a malfunction or when the searchlight is inadvertently turned on while the vehicle engine is not operating.

(2) It enables the xenon lamp to be illuminated during an emergency when the vehicle engine is not operating.

d. Main Power Switch. This switch on the universal control box has two positions: ON and OFF.

(1) When the switch is set to OFF, all power is removed from the searchlight except from the main power relay K5 in the universal control box. One side of the relay is connected directly to the external power source.

(2) When the switch is set to ON, aux B+ is distributed throughout the searchlight enabling the searchlight to be operated from the control box.

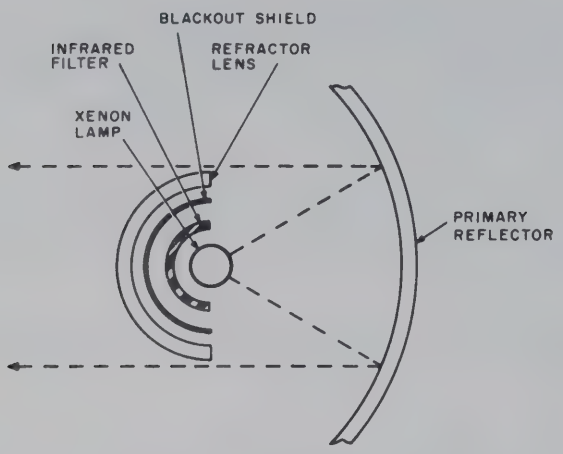
2—4. Converter
(fig. 2—1)

The converter is a silicon-controlled rectifier and transistorized oscillator. The converter produces 55 volts dc and 330 cycles (cps), 35 to 80 volts ac (determined by converter assembly used) from B+ (28 volts dc). The converter assembly can be separated into two basic circuits: the pulse-generating circuit and the inverter circuit. The pulse-generating circuits produces positive pulses which are applied to the inverter circuit, controlling its operation. The inverter circuit uses the positive pulses to produce ac and dc outputs. Both outputs are applied to the igniter assembly.

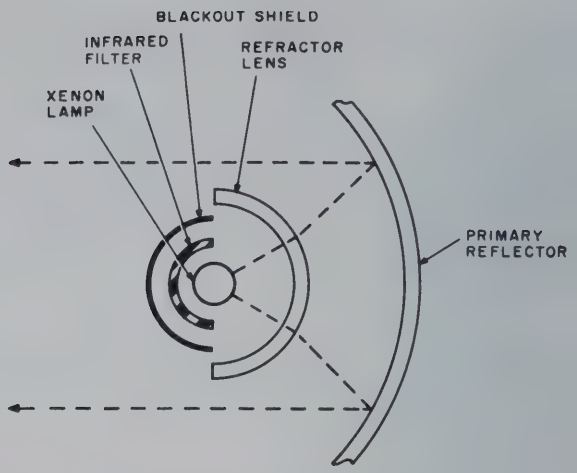
2—5. Igniter

The igniter assembly produces an RF signal (40 kilvolts (kv)) which is applied with the 55-volt dc output from the converter assembly to the xenon lamp for its ignition and illumination.

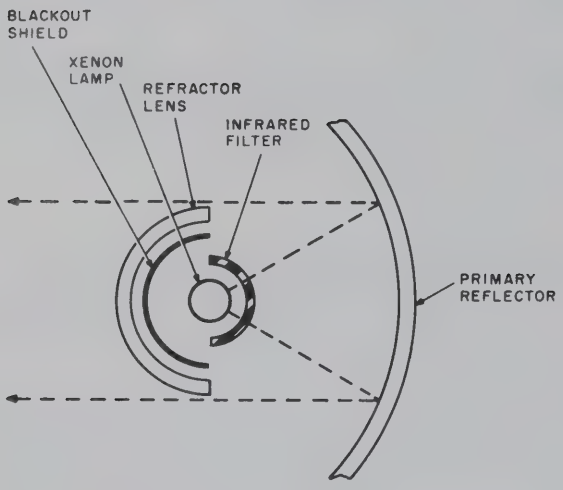
a. The 35 to 80-volt ac output from the converter assembly is applied to the primary of a high-voltage transformer within the igniter. The voltage is stepped up to 8,200 volts ac and applied through an autotransformer to a spark gap. This condition causes the spark gap to arc at which time capacitance and inductance within the igniter form a resonant circuit which produces an RF signal of 2 to 8 megacycles.



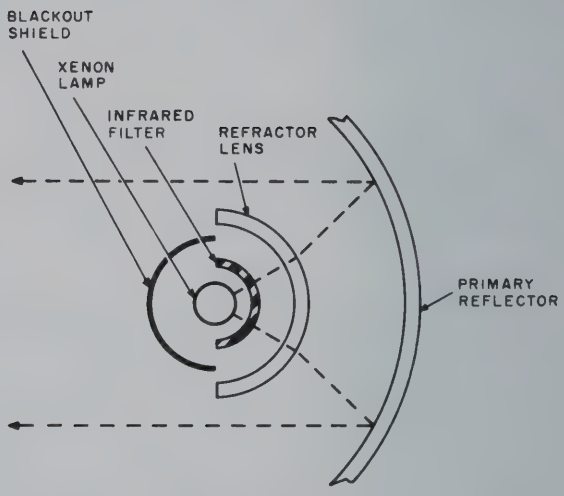
A. VISIBLE FOCUS



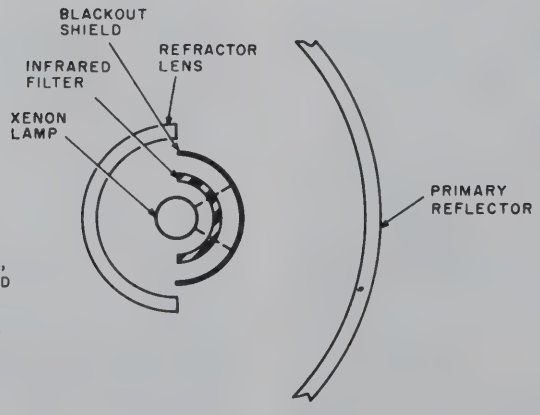
B. VISIBLE WIDE



C. INFRARED FOCUS



D. INFRARED WIDE



NOTES:

1. NORMAL POSITION OF REFRACTOR LENS, INFRARED FILTER AND BLACKOUT SHIELD WITH POWER OFF.
2. ON THE AN/VSS-2 AND AN/GSS-18(*), A PINK FILTER IS USED INSTEAD OF THE INFRARED FILTER.

E. BLACKOUT OR STANDBY

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Figure 2—2. Searchlight modes of operation.

b. The RF signal voltage is stepped up to 40 kv by autotransformer action and applied to the xenon lamp to cause initial ionization and lamp conduction. The 55-volt dc signal is applied through an autotransformer to the xenon lamp to increase the temperature of the xenon gas causing the level of lamp conduction to increase.

2-6. Xenon Lamp and Housing
(fig. 2-1)

a. To ignite and cause the xenon lamp to provide continuous illumination, the following sequence occurs:

(1) First, xenon gas is caused to conduct. This condition is accomplished by application of the 40-kv RF signal from the igniter assembly across the electrodes at the lamp. This creates a strong electrostatic field. The xenon gas ionizes producing an arc across the electrodes.

(2) The application of 55 volts dc further increases the conductivity of the xenon lamp gas by causing its temperature to increase.

(3) When the level of xenon lamp conduction increases to approximately 100 amperes, xenon lamp conduction can be maintained by B+ (28 volts dc). Therefore, the 40-kv RF signal and 55 volts dc are no longer required and are removed.

NOTE

The value of 100 amperes is used to indicate the normal level of xenon lamp conduction. Note, however, that all searchlights are not identical; therefore, this value of lamp conduction is an average figure.

b. The lamp housing assembly consists of the xenon lamp, the secondary reflector (AN/VSS-1 and AN/VSS-1A only), the infrared filter, the pink filter (AN/VSS-2 and AN/GSS-18(*) (only) the blackout shield, the refractor lens, the clear filter (AN/VSS-1 and AN/VSS-1A only) and lamp housing drive gears. The source and type of light (visible or infrared) originate at this point.

2-7. Lamp Drive Assembly
(fig. 2-1)

The lamp drive assembly consists of three drive motors and six limit switches. The drive motors change the position of the IR filter, the blackout shield, and the refractor lens, thereby setting up the mode of operation selected by the operator. The limit switches stop the drive motors when the IR filter, the blackout shield, and the refractor lens have reached their proper positions.

2-8. Relay Panel
(fig. 2-1)

The relay panel contains relays and circuitry to select the motor for the proper mode of operation and to automatically shut off the igniter-converter once the xenon lamp is fully on. The relay panel circuitry also automatically limits the overdrive capability to 15 seconds. Therefore, once an operator turns on the overdrive switch on the control box, the relay panel automatically controls the function and the operator has no control over the overdrive function for 15 seconds.

2-9. Heat Exchanger and Blower Assemblies
(fig. 2-1)

a. The blower motor is placed into operation at the same time the xenon lamp is ignited and illuminated. The heat exchanger and blower motor cool and circulate the air surrounding the xenon lamp, to prevent the temperature level of the xenon lamp from increasing to the point that will cause the xenon lamp to explode. The blower motor cools the xenon lamp when the lamp is illuminated and continues to cool the xenon lamp after it is shut off, provided the searchlight is operated for at least 3 to 4 minutes.

b. The blower motor operates in conjunction with the heat exchanger assembly to cool the xenon lamp. The heat exchanger does not contain any electrical components or moving parts. It consists of two isolated chambers each of which contains heat-expanding radiating cores. The heat exchanger is the air-to-air type with one chamber open to the outside ambient air and the other chamber open to the inside of the lamp housing. Ambient air is drawn in from the outside, circulated through one chamber, and forced out by the blower motor left-hand impeller. Air is circulated in the other chamber and through the lamp housing assembly by the right-hand blower motor impeller. The exchange of heat that occurs between the two chambers is due to their temperature differences. The temperature of the lamp housing assembly is maintained below 160 degree F in ambient temperatures of up to 115 degrees F.

2-10. Mounts
(fig. 2-1)

a. Shockmount Assembly. The mount used with

the AN/VSS—1(*) and AN/VSS—2 is part of the tank. The AN/VSS—1(*) and AN/VSS—2 are equipped with a shockmount assembly. The shockmount assembly is part of the searchlight subassembly. It consists of three ball-socket hitches for mounting the searchlight subassembly to the tank, and two torsion bars which protect the searchlight subassemblies from excessive stresses during gunfire.

b. Mount, Universal MT—3900/GSS—14. The AN/GSS—14 and AN/GSS—18 are equipped with Mount, Universal MT—3900/GSS—14. The mount consists of a pedestal and a yoke to which the searchlight subassembly is attached. The yoke is attached to the pedestal through a bearing assembly which enables the searchlight to turn in azimuth. The searchlight can be titled in elevation by loosening the manual brake wheels at the ends of the yoke. Azimuth and elevation scales have been added for the operators use.

c. Mount, Searchlight MT—3900A/GSS—14. The AN/GSS—14A, AN/GSS—14B, AN/GSS—18A, and AN/GSS—18B are equipped with Mount, Searchlight MT—3900A/GSS—14. This mount is identical to the one described in *b* above except that the operator positions the searchlight beam by operating azimuth and elevation handwheels on the yoke. Azimuth and elevation scales are illuminated by scale illumination switches on the pedestal. The cable harness is routed to the control box through the mount allowing the input power cable to be connected to the pedestal, thus simplifying operation.

Section II. CIRCUIT FUNCTION

2–11. AN/VSS–1 Power Application
(fig. 6—3)

Power is applied to blower motor B4 and the converter assembly of the AN/VSS—1 as follows:

a. The tank main power relay operates when the tank main power switch is set to ON, and the searchlight power switch is set to STANDBY or ON.

b. When the tank main power relay operates, 28 volts dc connects to C19 and through C19 and CR—7 to TB1—6 on the converter assembly. The voltage is routed through CR1 in the input circuit of blower motor relay K12 and operates K12. This action applies 28 volts dc (aux B+) to blower motor B4. The blower motor runs, ready to cool the xenon lamp.

c. The 28 volts dc is also fed to ballast resistor R19, terminal 1, through R19, to K13 (3-second shutdown circuit). K13 conducts and causes converter relay K14 to operate (para 2—20*a*).

NOTE

K13 (3-second shutdown circuit) is not an actual relay. It is a canned electronic circuit used to control the time required to operate and restore relay K14.

d. When converter relay K14 operates, 28 volts dc is applied through CB1 to TB1—5 of the converter assembly and causes the converter assembly to operate.

2–12. AN/VSS–1A through –1E and AN/VSS–2 Power Application
(fig. 6—4 through 6—7)

Power is applied to blower motor B4 and the converter assembly of all tank-mounted searchlights (other than AN/VSS—1) in the same manner. Refer to the appropriate schematic diagram (fig. 6—4 through 6—7) for circuit analysis in conjunction with the following discussion.

a. When the main power switch is placed at ON, 28 volts dc (aux B+) is applied to thermal switch S7. When the searchlight is initially turned on, thermal switch S7 is open; therefore, the 28 volts dc applied to it serves no function. When the main power relay is operated, 28 volts dc is applied through diode CR2 to blower motor B4 causing it to operate.

b. The 28 volts dc is also fed to ballast resistor R19, terminal 1, through R19, to K13 (3-second shutdown circuit). K13 conducts and causes converter relay K14 to operate.

NOTE

K13 (3-second shutdown circuit) is not an actual relay. It is an electronic circuit used to control the time required to operate and restore relay K14.

2-13. AN/GSS-14(*) and AN/GSS-18(*) Power Application

(fig. 6—8 and 6—9)

Power is applied to blower motor B4 and the converter assemblies of the AN/GSS—14(*) and AN/GSS—18(*) as follows:

a. When the searchlight is vehicle-mounted and the vehicle engine operates properly, oil pressure switch S6 closes and provides ground for main power relay K5. K5 operates and supplies 28 volts dc to C19.

b. If the vehicle engine malfunctions, oil pressure switch S6 opens. Main power relay K5 restores and removes 28 volts dc from C19.

c. When emergency override switch S4 is set to ON, main power relay K5 is connected to ground, oil pressure switch S6 is bypassed, and 28 volts dc is supplied to C19.

d. The 28 volts dc applied to C19 is distributed as described in paragraph 2—11 above.

2-14. Converter Circuit Function

There are five different models of the converter assembly: Varo model 9912, Varo model 9924, Varo model 9948, Melpar model F50001, and ITT model 6484. Each model is discussed below. The converter assembly contains two basic circuits; the pulse-generating circuit and the inverter circuit.

a. Pulse-Generating Circuit. This circuit produces positive pulses, 25 microseconds in duration, 1.5 milliseconds apart. These pulses are applied to the inverter circuit.

b. Inverter Circuit. This circuit uses the positive pulses to produce 35- to 80-volt ac, 330-cps and 55-volt dc output signals. These signals are fed to the igniter assembly to ignite the xenon lamp.

2-15. Converter Assembly (Varo Model 9912 and Melpar Model F50001)

(fig. 2—3)

Varo model 9912 and Melpar model F50001 are almost identical. This description applies to both models.

a. Pulse-Generating Circuit. The pulse-generating circuit consists of Q1 and its associated components on the printed circuit board. It generates pulses for firing Q1 and Q2 of the inverter circuit.

(1) Q1 is a unijunction oscillator. C1 charges through R1. Q1 emitter voltage rises exponentially toward the supply voltage. When the emitter voltage reaches its peak, the emitter is biased on and C1 discharges through the emitter.

(2) A pulse is generated and coupled through R4 to Q1 of the inverter circuit. The pulse is also coupled through CR2 and timing circuit R6, R7, and C3 to Q2 of the inverter circuit. CR3 and R5 provide a feedback loop for T1 primary when the core becomes saturated.

b. Inverter Circuit. Purpose of the circuit is described in paragraph 2—14*b*. This circuit consists of gating stages Q1 and Q2, capacitor C1, transformer T1, and a dc rectifier and filter circuit.

(1) The pulses or gate signals from the pulse-generating circuit are alternate pulses. They alternately trigger Q1 and Q2 every 1.5 milliseconds.

(2) Plus 28 volts dc is applied from TB1—5 to the primary center tap of T1, and to the anodes of Q1 and Q2.

(3) When gate Q1 is triggered on by the positive pulse from the pulse generating circuit current flows from T1—2 to T1—1 through Q1 and L1 to ground on TB1—4.

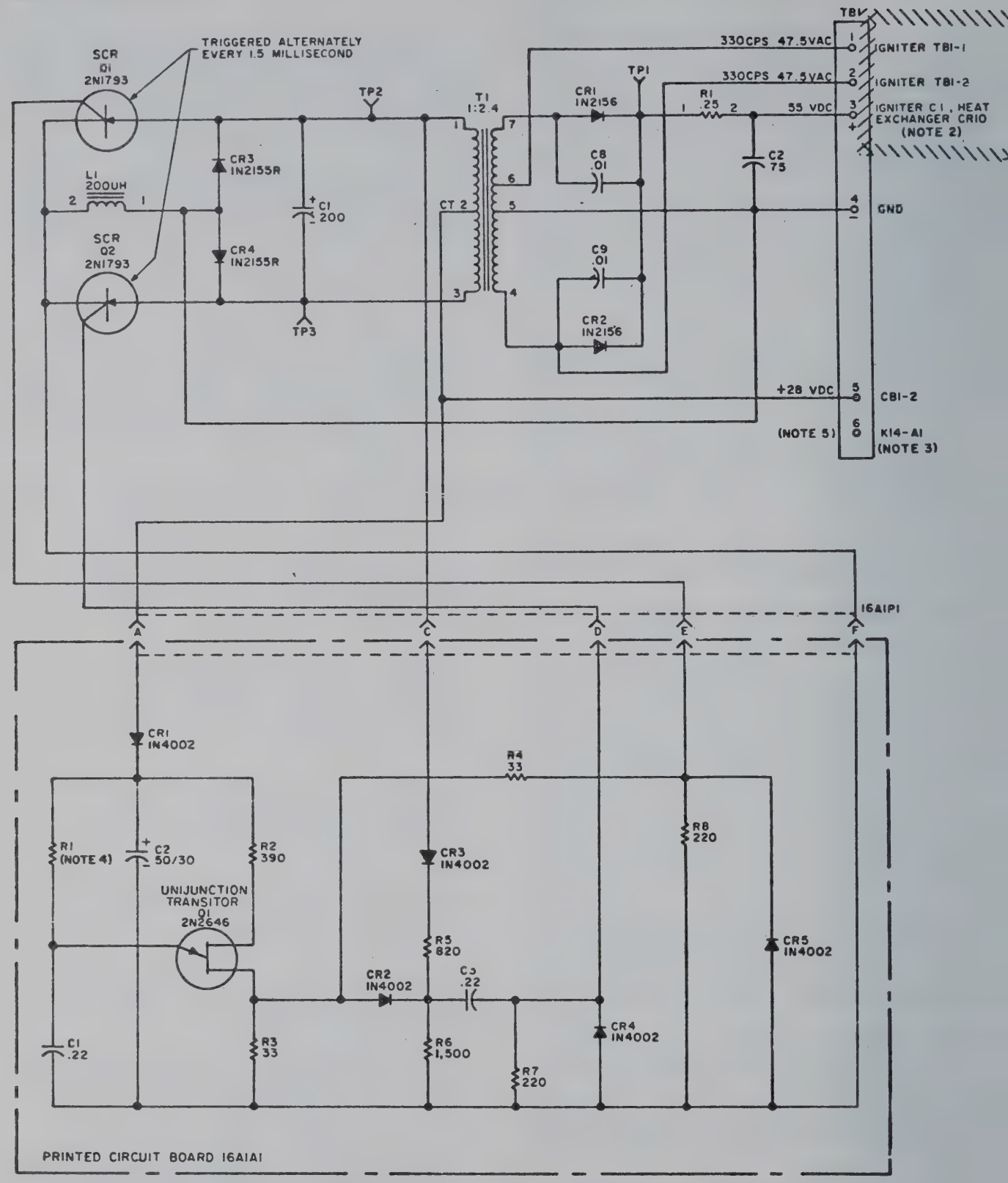
(4) Because of induction, the instantaneous voltage across terminals 1 and 3 of T1 is 56 volts (+ on terminal 3). Capacitor C1 charges to this voltage.

(5) Positive pulses from the pulse generating circuit cause Q2 to trigger on 1.5 milliseconds later. The transformer voltage then changes polarity. This forces C1 to discharge. Since Q2 is effectively shorted, C1 and its charge are connected directly across Q1.

(6) Q1 is turned off as the positive-going 56-volt pulse is applied to its cathode (+28 volts dc is present at its anode).

(7) Capacitor C1 discharges through L1. The resulting oscillatory ringing helps turn off Q1. Capacitor C1 reverses its charge polarity now that Q2 is on.

(8) On the next trigger pulse, Q1 is turned on.



NOTES:

1. UNLESS OTHERWISE INDICATED ALL RESISTOR VALUES ARE IN OHMS, ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. ON AN/VSS-1 ONLY, TERMINAL 3 OF TB1 IS CONNECTED TO CR9.
3. ON AN/VSS-1 ONLY, TERMINAL 6 OF TB1 IS CONNECTED TO RELAY PANEL P6-D
4. RESISTOR R1 IS SELECTIVE TO CONTROL OUTPUT FREQUENCY OF 330Hz ±10%.
5. NO INTERNAL CONNECTIONS ON PIN 6 OF TB1.

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Figure 2—3. Converter assembly (Varo model 9912 and Melpar model F50001), schematic diagram.

C1 is connected across Q2, thus turning it off. The cycle then repeats itself.

(9) The voltage waveform across T1 primary is a 56-volt, 330-cps square wave. It is stepped up by T1, rectified by CR1 and CR2, and filtered by R1 and C2.

(10) The 55-volt dc rectified output is applied to TB1—3. Transformer T1 is tapped at terminals 4 and 6 to pick off 35 to 80 volts ac. This signal is supplied to TB1—1 and TB1—2.

(11) Diodes CR3 and CR4 clamp negative voltage swings at Q1 and Q2 anodes. Bypass capacitors C8 and C9 prevent transients from damaging CR1 and CR2.

2-16. Converter Assembly (ITT Model 6484) (fig. 2—4)

a. Pulse-Generating Circuit. Purpose of the circuit is described in paragraph 2—14*a*. This circuit consists of switching transistors Q1 through Q6 and their associated components.

(1) The 28 volts dc on TB1—5 starts the converter. From there, it passes through CB1 to the center tap of T2 primary. CB1 will open if the converter or lamp fails. It will stay open until reset by hand.

(2) Starting bias network R5—R6 provides forward bias to two groups of switching transistors. Q1, Q2, and Q3 form one group. They connect in parallel through emitter balancing resistors R2, R3, and R4. Q4, Q5, and Q6 form the other group. They connect in parallel through emitter balancing resistors R7, R8, and R9.

(3) The emitter balancing resistors force the switching transistors to equally share load current. Due to slight differences, one group will conduct first. Transformer action will induce a voltage on T1 secondary. This voltage reverse-biases the nonconducting group of switching transistors.

(4) T1 has a square hysteresis loop characteristic. T1 and the conducting transistors reach saturation rapidly which reduces the drive into the conducting transistors. As the drive drops sharply, the opposite group of switching transistors starts to receive forward drive through induced voltage. At this point, conduction rapidly transfers to the previously nonconducting group. The voltage on T1 primary reverses. This completes the cycle.

(5) The switching action causes current to flow alternately in T2 primary. This produces an ac square-wave voltage on T2 secondary.

(6) R1 limits current in T1 primary when the core becomes saturated. C1 reduces spikes on the square wave.

b. Inverter Circuit. The inverter ac voltage output drives T1 primary and the igniter. It also feeds two levels of dc voltage to the igniter autotransformer. All output voltages are taken from T2 secondary.

(1) The secondary of T2 provides the ac voltage necessary to operate the igniter. CR1 and CR4 rectify the ac voltage that appears on T2. Current is limited by R10. The voltage at TB1—3 is 55 volts dc. T2—6 is the center tap return for this voltage.

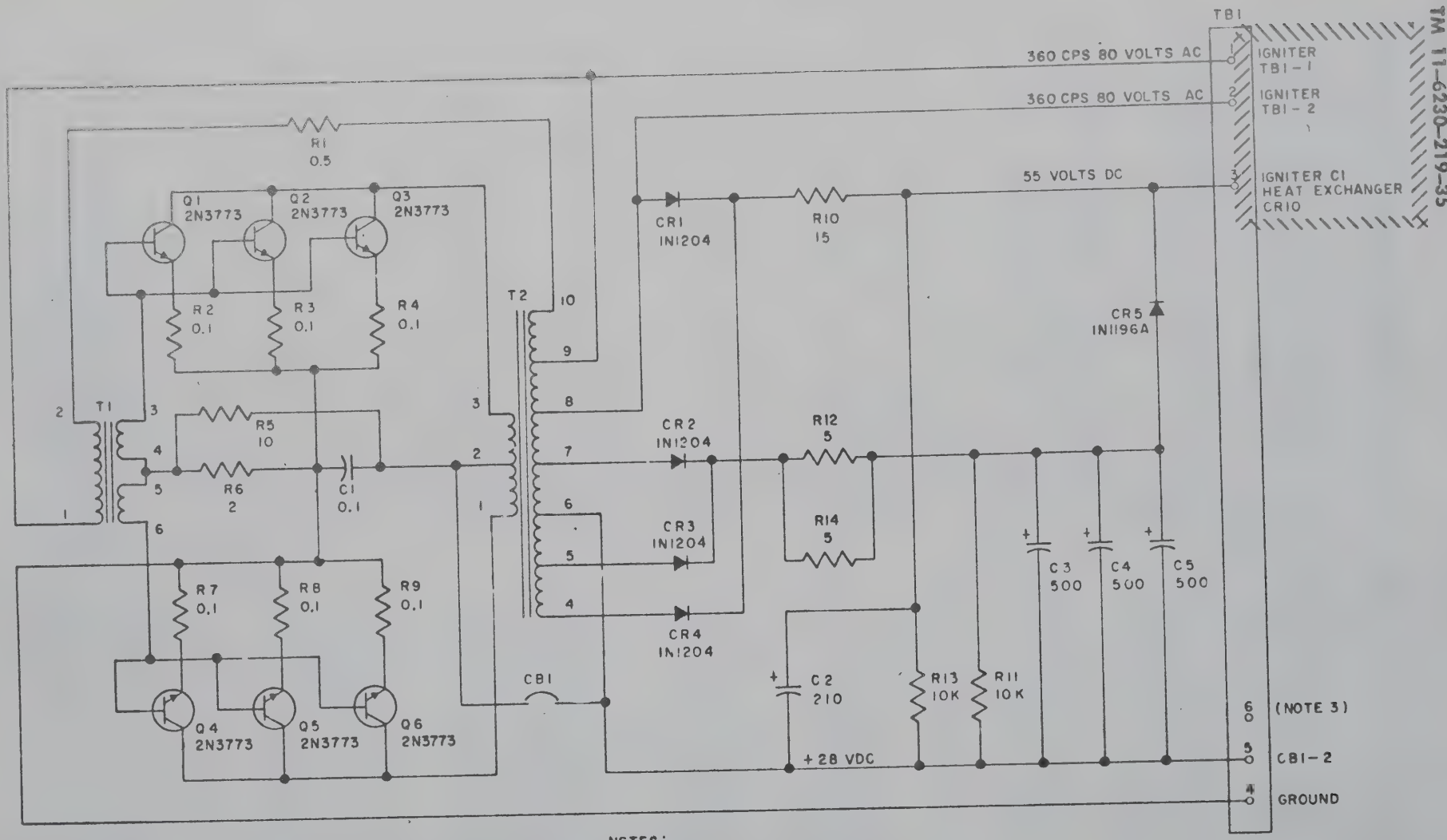
(2) CR2 and CR3 also rectify the ac voltage that appears on T2. The current is limited by R12 and R14. T2—6 is the center tap return for this voltage.

(3) Diode CR5 blocks the higher voltage at the junction of R10 and CR5 from energy storage capacitors C3, C4, and C5.

(4) When the xenon lamp ignites, current through R10 rises rapidly and causes a voltage drop at CR5 cathode. When the CR5 cathode voltage drops below the anode voltage, current flows through R12 and R14.

(5) CR5 cathode voltage continues to drop as current is increased through R12 and R14. As xenon lamp conduction increases, the main 28-volt dc power source begins supplying current to the lamp. The dc current from the converter is connected in series with the main power source by blocking diode CR10.

(6) C2, C3, C4, and C5 are energy storage capacitors. They provide a smoothing effect during lamp ignition. R11 and R13 discharge the capacitors when the converter is turned off.



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTANCE VALUES ARE IN OHMS ± 1%, 25 W, WIREWOUND.
2. ALL CAPACITANCE VALUES ARE IN MICROFARADS $^{+50\%}_{-10\%}$ 50 V
3. NO CONNECTIONS ON PIN 6 OF TB1
4. Q1 THRU Q6 ARE PART NUMBER SM-D-646610

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Figure 2—4. Converter assembly (ITT model 6484), schematic diagram.

2-17. Converter Assembly (Varo Model 9924 and Varo Model 9948)

(fig. 2-5 and 2-6)

Varo models 9924 and 9948 are almost identical except for reference designators and minor displacement of parts. To avoid repetition, only Varo model 9924 will be discussed in this paragraph.

a. Pulse-Generating Circuit. The purpose and function of the pulse-generating circuit is the same as that described in paragraphs 2-14 and 2-15*a*.

b. Inverter Circuit. Purpose of the circuit is described in paragraph 2-14*b*. This circuit is on a printed circuit board. The circuit consists of gating stages Q1 and Q2, capacitor C14, transformer T1, and the dc rectifier circuit.

(1) The pulses from the pulse-generating circuit are spaced 1.5 milliseconds apart and alternately trigger Q1 and Q2.

(2) Plus 28 volts dc is applied to TB1-5, to the primary center tap of T1, and to Q1 and Q2 anodes.

(3) When gate Q1 is triggered on by the positive pulse from the pulse-generating circuit, current flows from T1-2 to T1-1, through Q1, to ground on TB1-4.

(4) Because of induction the instantaneous voltage across terminals 1 and 3 of T1 is 56 volts (+ on terminal 3). Capacitor C14 charges to this voltage.

(5) Q2 is triggered on 1.5 milliseconds later from the pulse-generating circuit. The transformer voltage then changes polarity forcing C14 to discharge because Q2 is effectively shorted.

(6) Q1 is turned off as the positive-going 56-volt pulse is applied to its cathode.

(7) Capacitor C14 reverses its charge polarity now that Q2 is on.

(8) On the next trigger pulse, Q1 is turned on. C14 is connected across Q2 thus turning it off. The cycle then repeats itself.

(9) The switching action causes current to flow alternately in each half of the primary of T1, (2 to 3, then 2 to 1), which results in an ac square-wave voltage on the secondary winding of T1.

(10) The secondary winding of T1 (terminals 4 and 6) provides 80 volts ac to TB-1- and TB1-2.

(11) CR1 and CR2 provide a full-wave rectified voltage (55 volts dc) which is applied to TB1-3. Bypass capacitors C4 and C8 prevent transients from damaging CR1 and CR2.

2-18. Igniter Assembly (Varo Model 9911 and Melpar Model F50006)

(fig. 2-7)

There are two different igniter assemblies: Varo model 9911 and Melpar model F50006. Both models are interchangeable. This circuit description applies to both models. The igniter assembly produces an RF signal (40 kv) which is applied with the 55-volt dc signal from the converter assembly to the xenon lamp for its ignition and illumination.

a. The converter applies 35 to 80 volts ac, 330 cps to TB1-1 and TB1-2.

b. This signal is fed through RF filter capacitors C2 and C3 to the primary of high-voltage transformer T1.

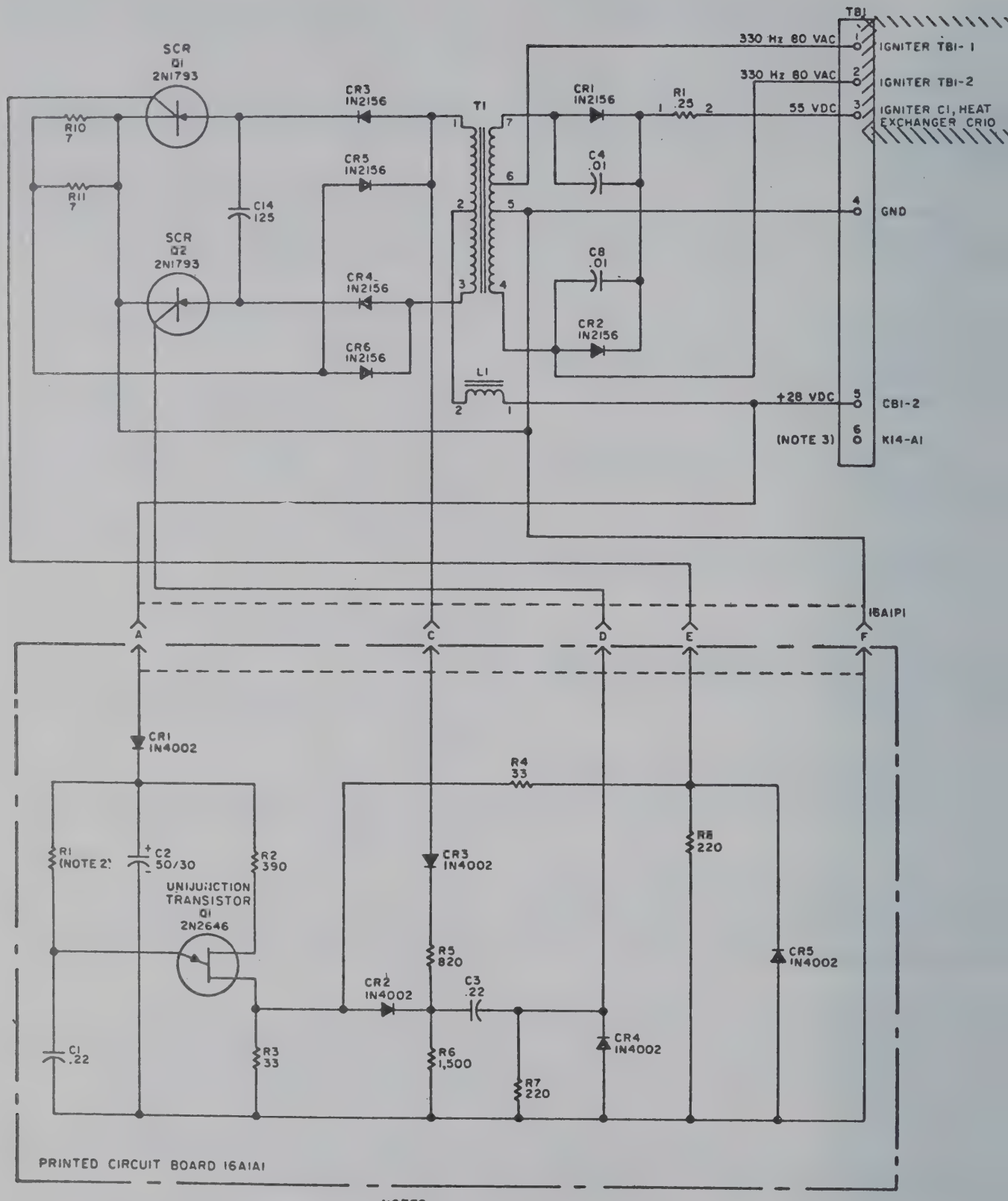
c. The ac signal is stepped up by T1 to 8,200 volts ac. It is then applied through autotransformer T2 to the spark gap.

d. This condition causes the spark gap to arc. This action causes the tank circuits (consisting of capacitor C4, and the inductance of T1 and part of T2) to oscillate and produce a 2- to 8-megacycle RF signal.

e. The RF signal between terminals 1 and 2 of T2, and the autotransformer action of T2 cause a 40-kv RF signal to be produced across T2.

f. The 40-kv RF signal is applied through J1 and the high-voltage cable to the xenon lamp, causing the lamp to ignite.

g. The 55-volt dc signal from the converter assembly is applied through ac bypass capacitor C1 and autotransformer T2 to the xenon lamp.



NOTES:

1. UNLESS OTHERWISE INDICATED ALL RESISTOR VALUES ARE IN OHMS, ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. RESISTOR R1 IS SELECTIVE TO CONTROL OUTPUT FREQUENCY OF 330Hz ±10%.
3. NO INTERNAL CONNECTIONS ON PIN 6 OF TB1.

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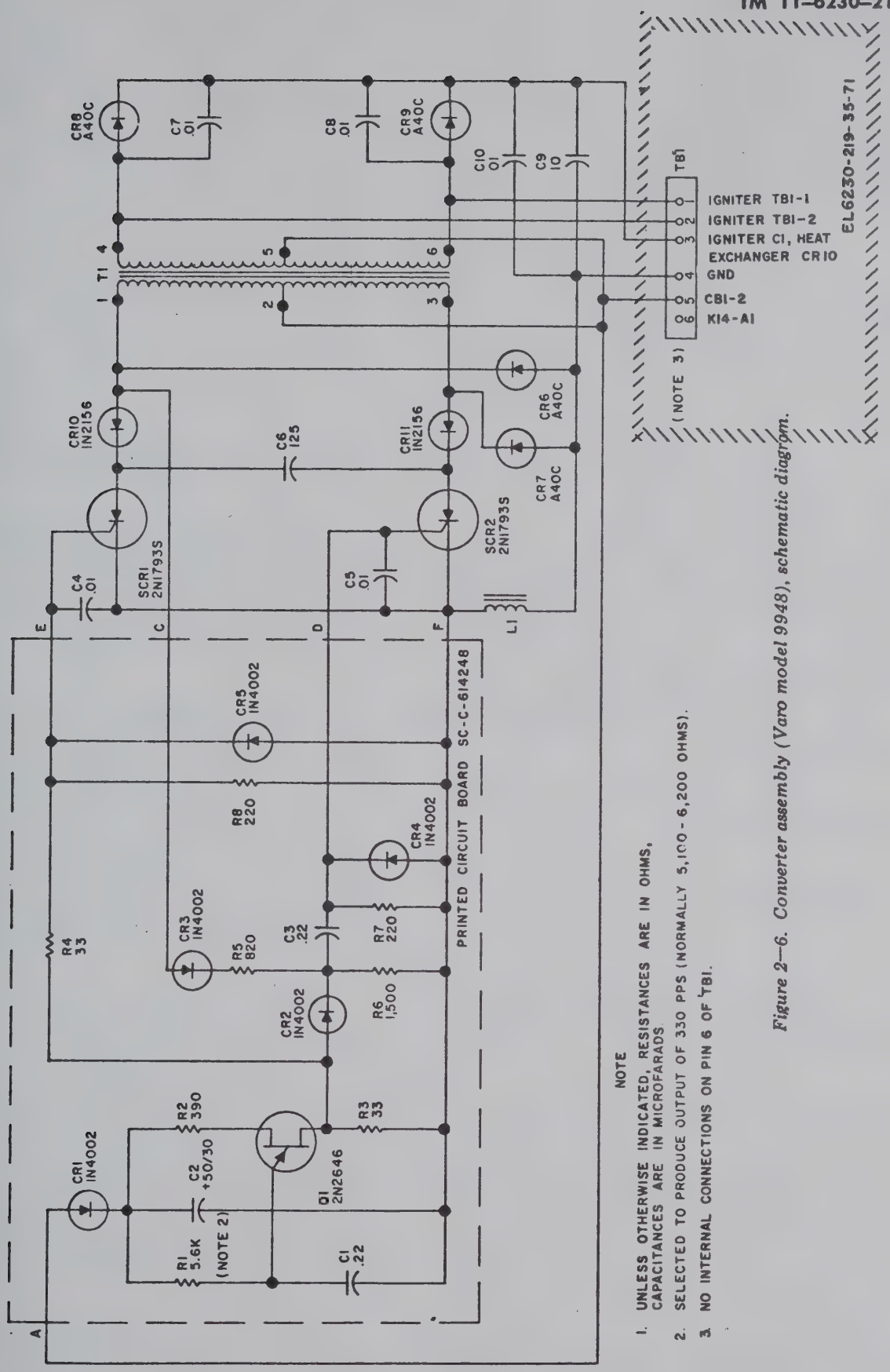
Figure 2—5. Converter assembly (Varo model 9924), schematic diagram.



NOTE

1. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN MICROFARADS
2. SELECTED TO PRODUCE OUTPUT OF 330 PPS (NORMALLY 5,100 - 6,200 OHMS).
3. NO INTERNAL CONNECTIONS ON PIN 6 OF TBI.

Figure 2–6. Converter assembly (Varo model 9948), schematic diagram.

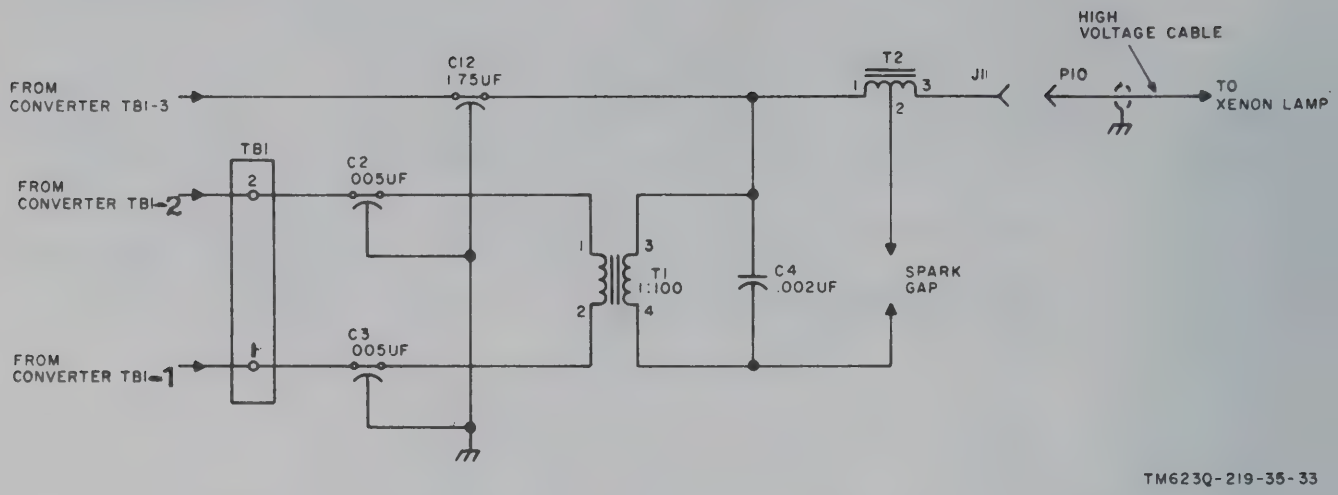


Figure 2—7. Igniter assembly (Varo model 9911 and Melpar model F50006), schematic diagram.

2-19. Relay Panel Function

There are three relay panel models: Varo model 9913, Varo model 9922, and Melpar model F40015. Varo model 9913 has replaceable relays. Varo model 9922 and Melpar model F40015 use printed circuits. See paragraph 1-5 for additional information. The relay panel has three circuits: a 3-second shutdown circuit, an overdrive time delay circuit, and a mode control relay circuit.

a. Three-Second Shutdown Circuit. This circuit performs three functions:

(1) Operates converter relay K14 to energize the converter circuit.

(2) Restores K14 when the xenon lamp lights.

(3) If the xenon lamp does not light within 3 seconds, restores relay K14 for about 1 second, then reoperates it.

b. Overdrive Time-Delay Circuit. This circuit operates overdrive relay K2 for 15 seconds.

c. Mode Control Relay Circuit. This circuit enables the searchlight to be operated in any of six modes of operation.

2-20. Relay Panel Assembly (Varo Model 9913)

a. Three-Second Shutdown Circuit (fig. 2—8). Purpose of the circuit is described in paragraph 2—19*a*.

(1) When the main power relay operates, 28 volts dc is applied to R19, CR9, and the emitter of Q3. The 28 volts dc is also applied to voltage divider R6, R12, and R4. This biases the Q3 base at 26 volts dc and its emitter at 28 volts dc. Q3 conducts and relay K14 operates.

(2) When K14 operates, 28 volts dc is fed to the converter assembly, R1, R2, and Q2. C1 charges through R1. In about 3 seconds the positive charge across C1 causes Q1 to conduct and produce a positive pulse across R3. This pulse is coupled to the gate of scr Q2. Q2 turns on. The voltage drop across R4 increases to 27 volts and is applied to the base of Q3. C19 charges to the higher voltage. Q3 is reverse biased and cut off; K14 restores. The contacts of K14 open removing B+ to the converter, and Q1 and Q2 are cut off.

(3) If the xenon lamp lights within 3 seconds, lamp current causes the Q3 emitter voltage to drop to 22 volts. This action back biases Q3 and restores K14. If the lamp lights before 3 seconds have elapsed, Q1 and Q2 cannot operate because 28 volts dc is removed before C1 can charge to a level sufficient to cause Q1 to conduct. If the lamp is not lighted within the 3-second period, Q1 and Q2 operate. Q3 is cut off for about 1 second and the cycle is repeated until the lamp is lighted or CB1 opens. The 1-second shutdown of the converter prevents overheating.

b. Overdrive Time-Delay Circuit (fig. 2—9). Purpose of the circuit is described in paragraph 2—19*b*.

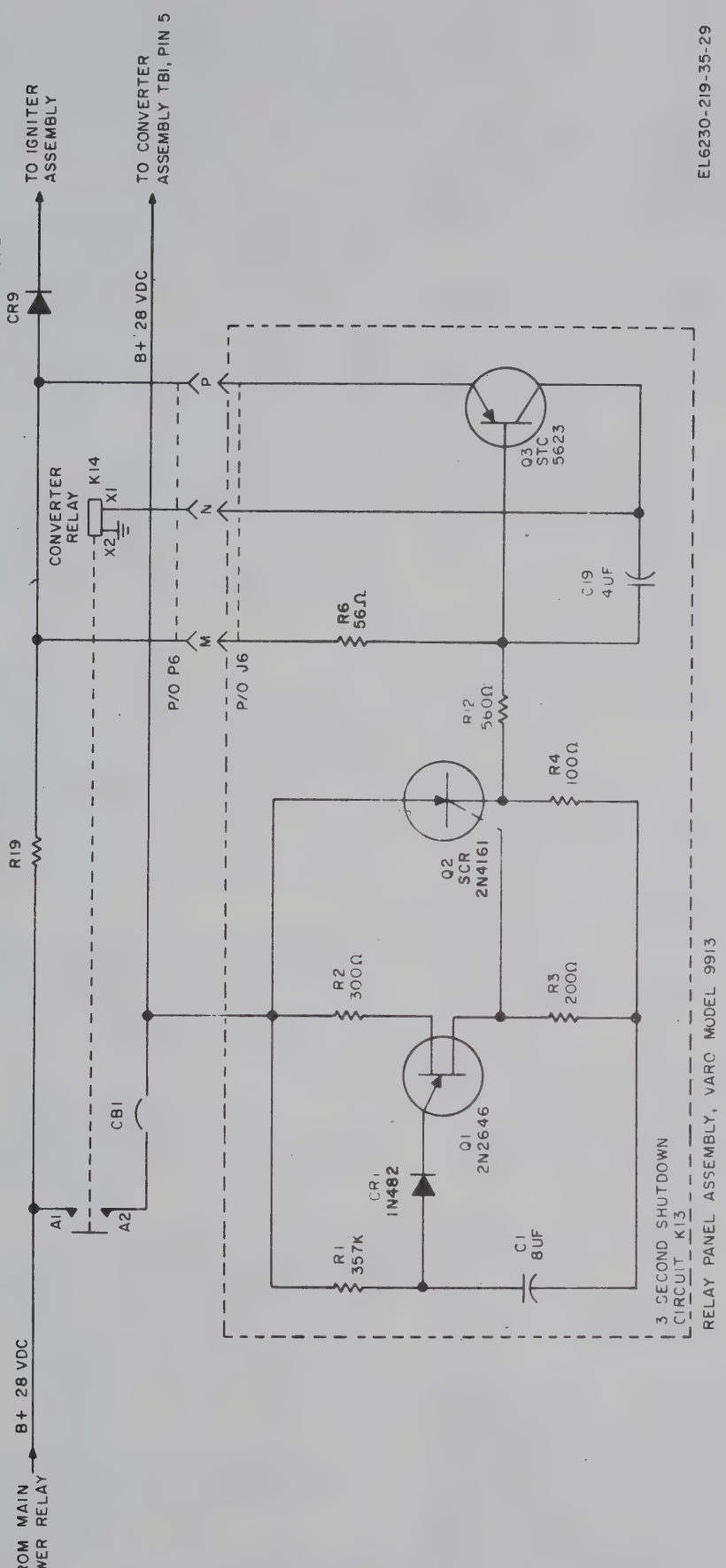


Figure 2–8. Three-second shutdown circuit K 13 (relay panel assembly, Varo model 9913) and associated circuits, schematic diagram.

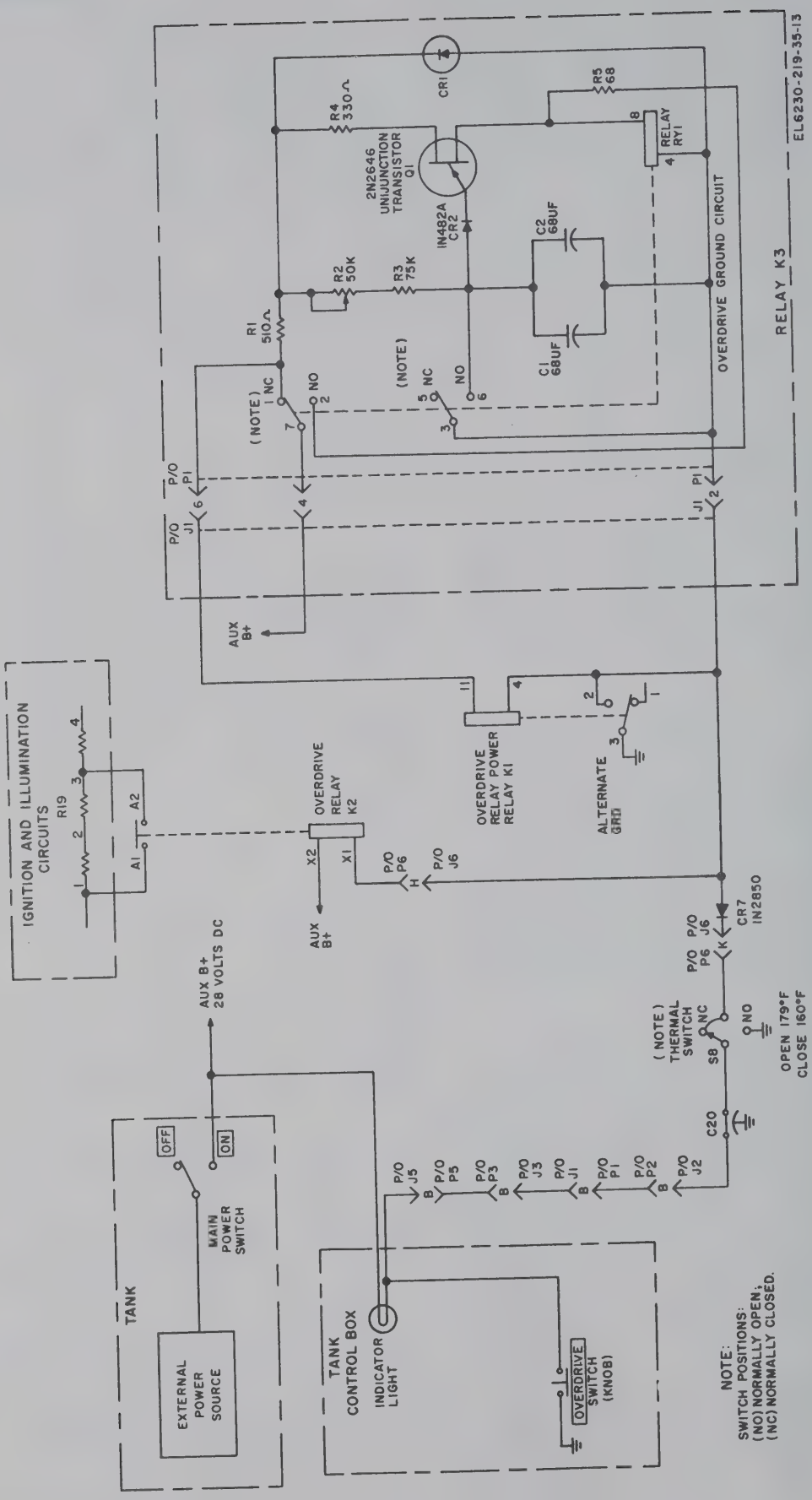


Figure 2—9. Overdrive time-delay circuit (relay panel assembly, Varo model 9913) and associated circuits, schematic diagram.

(1) The tank control box overdrive switch is a momentary-action switch. When activated, ground is applied to overdrive relay K2 and it operates. This action partially shorts R19. Lamp current and light intensity increases.

(2) Simultaneously, overdrive relay power relay K1 operates and connects K2 to alternate ground. This action keeps the overdrive circuit operating after the overdrive switch is released.

(3) Q1 is a unijunction oscillator. Its time period is controlled by R1, R2, R3, C1, and C2. Zener diode CR1 regulates the charging voltage.

(4) C1 and C2 charge through R1, R2, and R3. When C1 and C2 charge to about 19 volts, Q1 fires and relay RY1 operates. This action places a short across C1 and C2 and they discharge. The 28 volts dc is removed from relay K3 and the sequence ends.

(5) Thermal switch S8 is normally closed. When the air around the lamp exceeds 179 degrees F, S8 opens and prevents overdrive operation. When the air around the lamp drops to 160 degrees F, S8 closes and permits overdrive operation.

c. Mode Control Relay Circuit. Refer to paragraph 2—22.

2-21. Relay Panel Assembly (Varo Model 9922 and Melpar Model F40015)

a. Three-Second Shutdown Circuit (fig. 2—10). Purpose of the circuit is described in paragraph 2—19*a*.

(1) When the main power switch is set to ON, 28 volts dc (aux B+) is applied to the voltage-divider network consisting of R7, R6, and R4.

(2) When the main power relay operates, 28 volts dc is applied to R19 and CR10. Since the xenon lamp has yet to conduct, the full 28 volts dc is applied to the emitter of Q3. Since the base voltage of Q3 is 26 volts dc, Q3 is forward biased which causes it to conduct operating converter relay K14.

(3) The circuit continues to operate generally as described in paragraph 2-20a(2) and (3).

b. Overdrive Time-Delay Circuit (fig. 2—11). Purpose of the circuit is described in paragraph 2—19*b*.

(1) The tank control box overdrive switch is a momentary-action switch. When activated, ground is applied to overdrive relay K2 causing it to operate. This action partially shorts R19. Lamp current and intensity increase.

(2) Relay K1 operates and connects the overdrive ground circuit to an alternate ground through K1 contacts B1 and B2. This action keeps the overdrive circuit operating after the overdrive switch is released.

(3) The RC time-delay network, C3, begins charging through R8, CR5 and R10. When the positive charge across the capacitors reaches about 19 volts, unijunction transistor Q4 conducts and the overdrive sequence ends.

(4) When Q4 conducts, it produces a positive pulse across R12 which causes Q5 to conduct. It also causes C3 to discharge.

(5) When Q5 conducts, it effectively shorts out K1 and the relay restores. Alternate ground is removed from the overdrive ground circuit.

(6) With the overdrive ground circuit open, overdrive relay K2 restores and the short circuit across R19 is removed. The intensity of light emitted by the searchlight returns to normal.

(7) Thermal switch S8 normally is closed. When the air around the lamp exceeds 179 degrees F, it opens and prevents overdrive operation. When the air around the lamp drops to 160 degrees F, it closes and permits overdrive operation.

c. Mode Control Relay Circuit. Refer to paragraph 2—22.

2-22. Mode Control Circuit Function (fig. 6—10 through 6—12)

The mode control circuits for all searchlight models are basically the same. Figures 6—10, 6—11, and 6—12 show three different configurations. To avoid repetition, only the circuit shown in figure 6—10 (AN/VSS—1) will be discussed. Note that there is a reference designator difference between models as shown below:

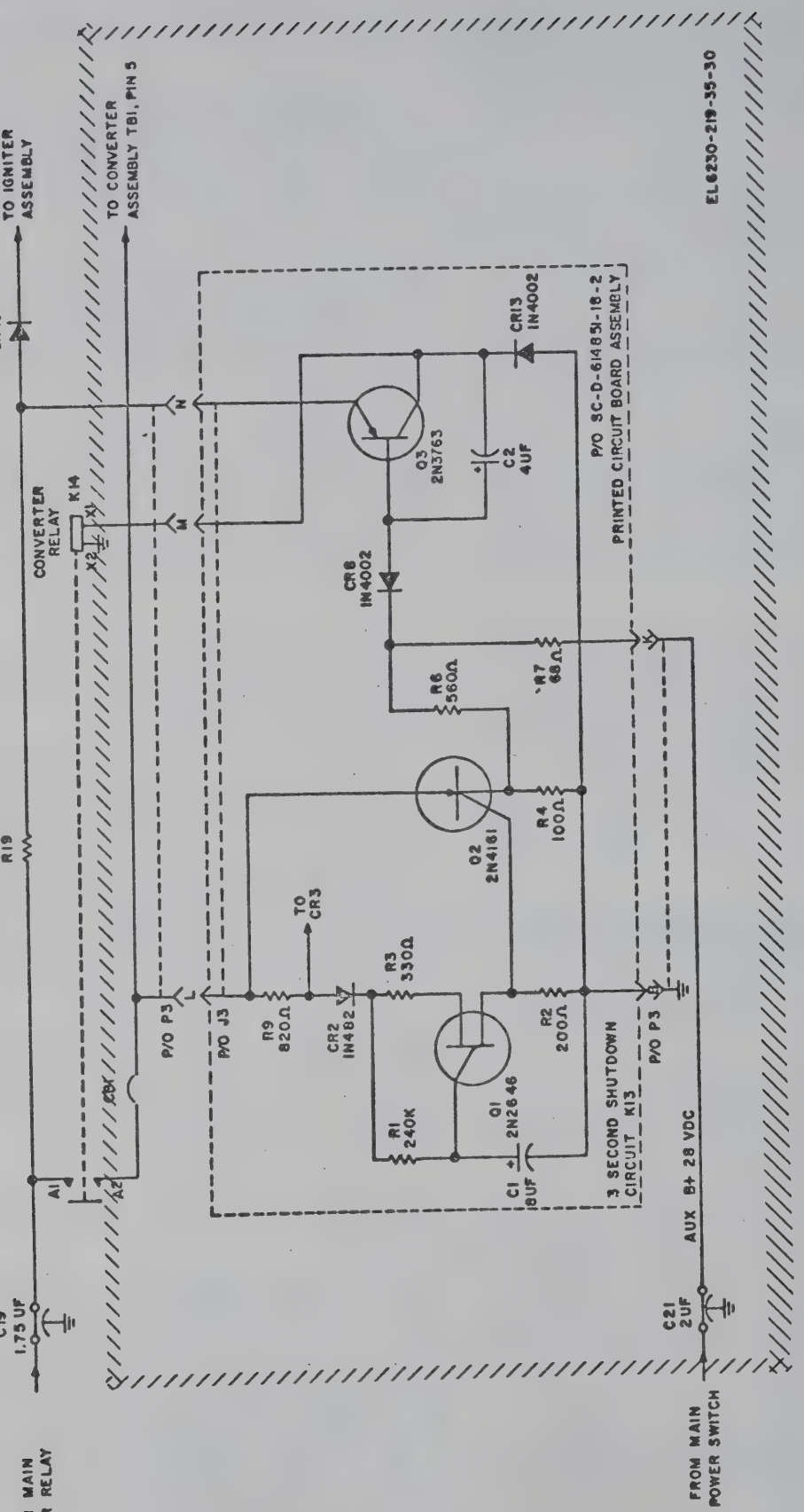


Figure 2–10. Three-second shutdown circuit K13 (relay panel assemblies, Varo model 9922 and Melpar model F40015) and associated circuits, schematic diagram.

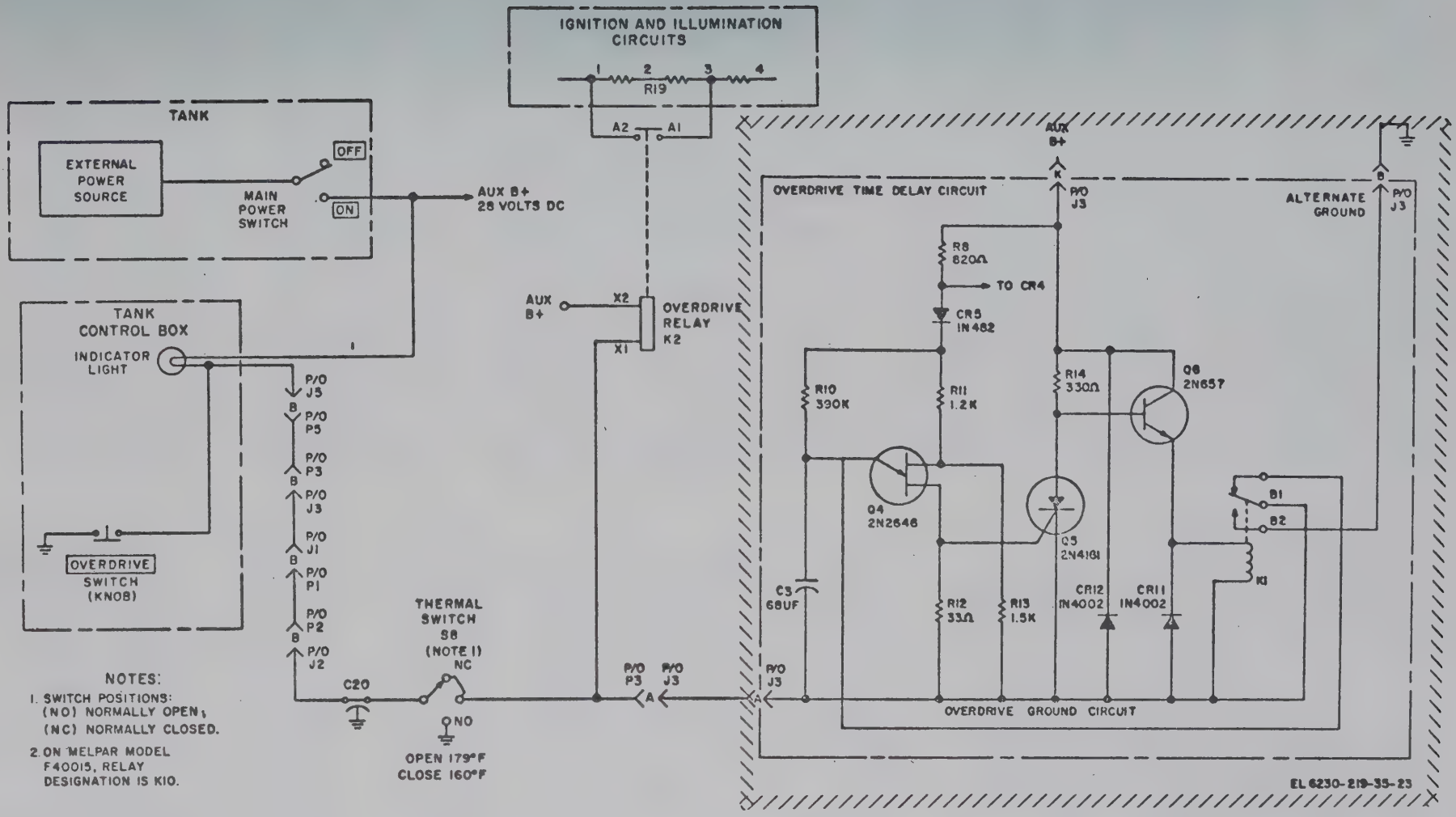


Figure 2—11. Overdrive time-delay circuit (relay panel assemblies, Varo model 9922 and Melpar model F40015) and associated circuits, schematic diagram.

Circuit	Relay panel assemblies		
	Varo model 9913	*Varo model 9922*	*Melpar model F40015*
IR filter	K7, CB2	K9, CB5, R17	K7, CB2, RA
Blackout shield	K8, CB3	K8, CB4, R16	K8, CB3, RB
Refractor lens	K9, CB4	K7, CB3, R15	K9, CB4, RC

a. SEARCHLIGHT Power Switch.

(1) Control of the SEARCHLIGHT power switch S1 determines the operational status of the ignition and illumination circuit, blower motor circuit, and mode SELECTOR SWITCH S2.

(2) With switch S1 at OFF, the searchlight attains a normal condition. Other than the distribution of aux B+ (28 volts dc) from the main power switch, no other power is distributed within the searchlight.

(3) With switch S1 at STANDBY, 28 volts dc (aux B+) is applied through the A-section of S1 to the main power relay in the tank, the B-section of S1, and the refractor and the IR sections of mode SELECTOR SWITCH S2.

(*a*) Applying 28 volts dc to the main power relay causes the relay to energize and 28 volts dc (B+) is applied to the ignition and illumination circuits and the blower motor circuit. The xenon lamp illuminates, the blower motor operates, and the xenon lamp is cooled.

(*b*) Applying 28 volts dc to the B-section of S1 has no effect on the searchlight at this time.

(*c*) Applying 28 volts to the refractor and IR sections of mode SELECTOR SWITCH S2 enables S2 to control the visible and IR mode control circuit and the refractor (wide and focus modes) control circuit.

(*d*) Although the xenon lamp is illuminated and the IR filter and refractor lens positions can be changed, no light is emitted by the searchlight. The position of the metal blackout shield cannot be changed; therefore, the searchlight is blacked out.

(4) With switch S1 at ON, 28 volts dc is applied from the B-section of S1 to the blackout section of mode SELECTOR SWITCH S2. This condition allows S2 to control the blackout mode control circuit and enables the search light to emit light.

b. Mode SELECTOR SWITCH. Mode SELECTOR SWITCH S2 essentially consists of four parts: the IR section, the blackout section, the refractor section, and the overdrive section. Operation of this switch enables the operator to control the six searchlight modes as described below. It is assumed that SEARCHLIGHT power switch S1 is at ON.

(1) *IR focus.* IR and refractor control voltages (28 volts dc) are prevented from being applied to relays K7 and K9 because of the open switch connections in the IR and refractor sections of the switch. As a result, the IR filter remains in front of the xenon lamp and the refractor lens remains behind the xenon lamp. Blackout control voltage (28 volts dc) is applied to relay K8 through the closed switch connections in the blackout section of the switch. This condition causes the metal blackout shield to move behind the xenon lamp. Only the IR filter is in the light beam path; therefore, the searchlight emits a focused beam of infrared light.

(2) *IR wide.* IR control voltage is prevented from being applied to relay K7 because of the open switch connection in the IR section of the switch. The IR filter remains in front of the xenon lamp; however, blackout and refractor control voltages are applied to relays K8 and K9 through the closed switch connections in the blackout and refractor sections of the switch. This action causes the metal blackout shield to move behind the xenon lamp and the refractor lens to move to the front of the xenon lamp. The IR filter and refractor lens are in the light beam path; therefore, the searchlight emits a wide beam of infrared light.

(3) *Blackout.* All control voltages (IR, blackout and refractor) are prevented from being applied to relays K7, K8 and K9 because of the open switch connections in the IR, blackout, and refractor sections of the switch; the IR filter, metal blackout shield, and refractor lens remain in the normal position. The metal blackout shield prevents the searchlight from emitting any light.

(4) *Vis wide.* All control voltages (IR, BO, and refractor) are applied to relays K7, K8, and K9 because of the closed switch connections in the IR, blackout, and refractor sections of the switch. This condition causes the IR filter and metal blackout shield to move behind the xenon lamp and the refractor lens to move to the front of the xenon lamp. Only the refractor lens is in the light beam

path; therefore, the searchlight emits a wide beam of visible light.

(5) *Vis focus.* Refractor control voltage is prevented from being applied to relay K9 because of the open switch connection in the refractor section of the switch. As a result, the refractor lens remains behind the xenon lamp; however, IR and blackout control voltages are applied to relays K7 and K8 through the closed switch connections in the IR and blackout sections of the switch. This condition causes the IR filter and metal blackout shield to move behind the xenon lamp. The searchlight emits a focused beam of visible light.

(6) *Overdrive.* The searchlight is placed in the overdrive mode of operation by momentarily pulling the mode SELECTOR SWITCH control knob. This condition causes the overdrive section of the switch to close and connect the overdrive ground circuit and the indicator lamp to ground.

(*a*) The overdrive sequence starts and causes the light intensity produced by the xenon lamp to increase and the indicator light to illuminate.

(*b*) Once the overdrive sequence starts, it is maintained by the overdrive circuit for a preset period of time; therefore, releasing the mode SELECTOR SWITCH control knob will not end the overdrive sequence.

(*c*) After a preset period has elapsed, the overdrive circuit terminates the overdrive sequence and causes the light intensity produced by the xenon lamp to decrease to normal and the indicator light to shut off.

c. Visible and IR Mode Control Circuit.

(1) Understanding and being able to identify the normal condition of the circuit is the basis for determining how the circuit operates. The normal condition of the visible and IR mode control circuit is described below.

(*a*) IR control relay K7 is deenergized.

(*b*) Limit switch S1 is in the closed (NC) position.

(*c*) Limit switch S2 is held in the open (NO) position by cam 2 attached to the IR filter.

(*d*) The IR filter is in front of the xenon lamp (in the light beam path) in the IR mode of operation.

(2) When the main power switch is set ON, aux B+ (28 volts dc) is applied to the normally closed (NC) terminals of limit switches S1 and S2 and SEARCHLIGHT power switch S1A. Filter capacitors C21 and C22 are ac bypass components used to reduce the effects of RF interference from the 28-volt dc line; line interference is shorted to ground.

(3) Setting the SEARCHLIGHT power switch from the OFF to either STANDBY or ON applies IR control voltages (28 volts dc) for the visible and IR modes through S1A to mode SELECTOR SWITCH S2. This condition enables mode SELECTOR SWITCH S2 to control the position of the IR filter.

(4) Setting mode SELECTOR SWITCH S2 in the IR FOCUS or IR WIDE position prevents the IR control voltage from being applied to IR control relay K7. As a result, the circuit is unchanged and remains in the normal condition. The normal position of the IR filter enables the searchlight to emit infrared light.

(5) Setting the SELECTOR SWITCH S2 at BO does not change the normal condition of the circuit. Although the IR filter is in a position that will enable the searchlight to produce infrared light, the searchlight will not emit any light. The metal blackout shield blacks out the searchlight.

(6) Setting mode SELECTOR SWITCH S2 in the VIS WIDE or VIS FOCUS position causes the IR control voltage (28 volts dc) to be applied to IR control relay K7. The relay becomes energized and causes the following to occur:

(*a*) Relay contacts 5-6 close; the bottom of IR filter drive motor B3 is connected to ground and limit switch S2 is disconnected from the motor circuit.

(*b*) Relay contacts 2-3 close; ground is disconnected from the motor circuit and limit switch S1 is connected to the top of IR filter drive motor B3.

(*c*) Aux B+ from limit switch S1 is applied through relay contacts 2-3 to IR filter drive motor

B3. The motor starts to rotate clockwise (cw) and causes the IR filter to move toward the rear of the xenon lamp.

(*d*) Cams 1 and 2 are attached to the IR filter. When the IR filter is in front of the xenon lamp, cam 2 holds limit switch S2 in the open (NO) position. As the IR filter starts to move toward the rear of the xenon lamp, cam 2 releases from limit switch S2 and allows the switch to return to the closed (NC) position.

NOTE

Limit switch S2 was disconnected from the motor circuit when IR control relay K7 was energized. Limit switch S2, therefore, has no effect on the motor circuit when it returns to the closed (NC) position; however, it does place the limit switch in the proper position for moving the IR filter to the front of the xenon lamp when visible light is no longer required, mode SELECTOR SWITCH S2 is set out of the VIS WIDE or VIS FOCUS position.

(*e*) When the IR filter reaches its proper position behind the xenon lamp, cam 1 attached to the IR filter actuates limit switch S1 and causes it to switch and be held in the open (NO) position. Limit switch S1 removes aux B+ and connects ground to IR filter drive motor B3. The removal of aux B+ and the grounding of both sides of the motor brakes the motor to a stop.

(*f*) With the IR filter positioned behind the xenon lamp, the searchlight emits only visible light.

(7) Setting mode SELECTOR SWITCH S2 out of the VIS WIDE or VIS FOCUS removes the IR control voltage (28 volts dc) from IR control relay K7. The relay becomes deenergized and the following occurs:

(*a*) Relay contacts 1—3 close. Ground is connected to the top of IR filter drive motor B3 and limit switch S1 is disconnected from the motor circuit.

(*b*) Relay contacts 5—7 close. Ground is disconnected from the motor circuit and limit switch S2 is connected to the bottom of IR filter drive motor B3.

(*c*) Aux B+ from limit switch S2 is applied through relay contacts 5—7 to IR filter drive motor B3. Voltage polarity across the motor is reversed and the motor starts to rotate ccw. This causes the IR filter to move toward the front of the xenon lamp.

(*d*) When the IR filter is behind the xenon lamp, cam 1 holds limit switch S1 in the open (NO) position. As the IR filter starts to move toward the front of the xenon lamp, cam 1 releases from limit switch S1 and the switch returns to the closed (NC) position.

NOTE

Limit switch S1 was disconnected from the motor circuit when IR control relay K7 was deenergized. Limit switch S1, therefore, has no effect on the motor circuit, when it returns to the closed (NC) position; however, it places the limit switch in the proper position to move the IR filter to the rear of the xenon lamp when visible light is required; that is, when mode SELECTOR SWITCH S2 is set at either VIS WIDE or VIS FOCUS.

(*e*) When the IR filter reaches its proper position in front of the xenon lamp, cam 2 attached to the IR filter actuates limit switch S2 and causes it to switch and be held in the open (NO) position. Limit switch S2 removes AUX B+ and connects ground to IR filter motor B3. The removal of AUX B+ and the grounding of both sides of the motor brakes the motor to a stop.

(*f*) With the IR filter in its normal position, the searchlight emits only infrared light.

d. Blackout Mode Control Circuit.

(1) The normal condition of the blackout mode control circuit is described below.

(*a*) Blackout control relay K8 is deenergized.

(*b*) Limit switch S3 is in the closed (NC) position.

(*c*) Limit switch S4 is held in the open (NO) position by cam 4 attached to the metal blackout shield.

(*d*) The metal blackout shield is in front of the xenon lamp (in the light beam path) in the blackout mode of operation.

(2) When the main power switch is set to ON, aux B+ (28 volts) is applied to the normally closed (NC) terminals of limit switches S3 and S4 and SEARCHLIGHT power switch S1A. Filter capacitors C21 and C23 are ac bypass components used to reduce the effects of RF interference from the 28-volt dc line; line interference is shorted to ground.

(3) Setting SEARCHLIGHT power switch S1 to STANDBY or mode SELECTOR SWITCH S2 to BO prevents 28 volts dc from being applied to blackout control relay K8. As a result, the circuit is unchanged and remains in the normal condition. The normal position of the metal blackout shield blacks out the searchlight.

(4) Setting SEARCHLIGHT power switch S1 to ON and mode SELECTOR SWITCH S2 to IR FOCUS, IR WIDE, VIS WIDE, or VIS FOCUS, causes blackout control voltage (28 volts dc) to be applied to blackout control relay K8. The relay becomes energized and causes the following to occur:

(*a*) Relay contacts 5-6 close. The bottom of blackout shield drive motor B2 is connected to ground, and limit switch S4 is disconnected from the motor circuit.

(*b*) Relay contacts 2-3 close. Ground is disconnected from the motor circuit and limit switch S3 is connected to the top of blackout shield drive motor B2.

(*c*) Aux B+ from limit switch S3 is applied through relay contacts 2-3 to blackout shield drive motor B2. The motor starts to rotate cw and the metal blackout shield moves toward the rear of the xenon lamp.

(*d*) Cams 3 and 4 are attached to the metal blackout shield. When the metal blackout shield is in front of the xenon lamp, cam 4 holds limit switch S4 in the open (NO) position. As the metal blackout shield starts to move toward the rear of the xenon lamp, cam 4 releases from limit switch S4 and the switch returns to the closed (NC) position.

NOTE

Limit switch S4 was disconnected from the motor circuit when the blackout control relay K8 was energized. The limit switch, therefore, has no effect on the motor circuit when it returns to the closed (NC) position; however, it places the limit switch in the proper position to move the metal blackout shield to the front of the xenon lamp when blackout of the searchlight is required; mode SELECTOR SWITCH S2 is set to BO or the SEARCHLIGHT power switch is set out of the ON position.

(*e*) When the metal blackout shield reaches its proper position behind the xenon lamp, cam 3 attached to the metal blackout shield actuates limit switch S3 and causes it to switch and be held in the open (NO) position. Limit switch S3 removes aux B+ and connects ground to the blackout shield drive motor B2. The removal of aux B+ and the grounding of both sides of the motor brakes the motor to a stop.

(*f*) With the metal blackout shield positioned behind the xenon lamp, the searchlight emits either infrared or visible light.

(5) Setting mode SELECTOR SWITCH S2 to BO removes the blackout control voltage (28 volts dc) from blackout control relay K8. The relay is deenergized and the following occurs:

(*a*) Relay contacts 1-3 close. Ground is connected to the top of blackout shield drive motor B2 and limit switch S3 is removed from the motor circuit.

(*b*) Relay contacts 5-7 close. Ground is disconnected from the motor circuit and limit switch S4 is connected to the bottom of blackout shield drive motor B2.

(*c*) Aux B+ from limit switch S4 is applied through relay contacts 5-7 to blackout shield drive motor B2. Voltage polarity across the motor is reversed and the motor starts to rotate ccw. This condition causes the metal blackout shield to move toward the front of the xenon lamp.

(*d*) When the metal blackout shield is behind the xenon lamp, cam 3 holds limit switch S3 in the open (NO) position. As the metal blackout shield starts to move toward the front of the xenon lamp, cam 3 releases from limit switch S3 and the switch returns to the closed (NC) position.

NOTE

Limit switch S3 was disconnected from the motor circuit when the blackout control relay was deenergized. Limit switch S3, therefore, has no effect on the motor circuit when it returns to the closed (NC) position; however, it places the limit switch in the proper position to move the metal blackout shield to the rear of the xenon lamp when blackout of the searchlight is not required; the mode SELECTOR SWITCH is set out of the BO position and the SEARCHLIGHT power switch is set to ON.

(*e*) When the metal blackout shield reaches its proper position in front of the xenon lamp, cam 4 attached to the metal blackout shield actuates limit switch S4 and causes it to switch and be held in the open (NO) position. Limit switch S4 removes aux B+ and connects ground to blackout shield drive motor B2. The removal of aux B+ and the grounding of both sides of the motor brakes the motor to a stop.

(*f*) With the metal blackout shield in its normal position, the searchlight is blacked out.

e. Refractor (Wide and Focus Modes) Control Circuit.

(1) The normal condition of the refractor control circuit is described below:

(*a*) Refractor control relay K9 is deenergized.

(*b*) Limit switch S5 is in the closed (NC) position.

(*c*) Limit switch S6 is held in the open (NO) position by cam 6 attached on the refractor lens.

(*d*) The refractor lens is behind the xenon lamp (out of the light beam path) in the focused mode of operation.

(2) When the main power switch is set to ON, aux B+ (28 volts dc) is applied to the normally closed (NC) terminals of limit switches S5 and S6 and SEARCHLIGHT power switch SIA. Filter capacitors C21 and C24 are ac bypass components used to reduce the effects of rf interference from the 28-volt dc line. Line interference is shorted to ground.

(3) Setting SEARCHLIGHT power switch S1 from the OFF to either STANDBY or ON applies control voltage (28 volts dc) for the wide and focus modes through SIA to mode SELECTOR switch S2. This condition enables mode SELECTOR SWITCH S2 to control the position of the refractor lens.

(4) Setting mode SELECTOR SWITCH S2 to either IR FOCUS or VIS FOCUS prevents refractor control voltage from being applied to refractor control relay K9. As a result, the circuit is unchanged and remains in its normal condition. The normal position of the refractor lens enables the searchlight to emit a focused beam of either visible or infrared light.

(5) Setting mode SELECTOR switch S2 to BO does not change the normal condition of the circuit. Although the refractor lens is in a position that will enable the searchlight to produce a focused beam of either infrared or visible light, the searchlight will not emit light. The metal blackout shield blacks out the searchlight.

(6) Setting mode SELECTOR switch S2 to either IR WIDE or VIS WIDE causes the refractor control voltages to be applied to refractor control relay K9. The relay becomes energized and the following occurs:

(*a*) Relay contacts 5-6 close. The bottom of refractor lens drive motor B1 is connected to ground and limit switch S6 is disconnected from the motor circuit.

(*b*) Relay contacts 2-3 close. Ground is removed from the motor circuit and limit switch S5 is connected to the top of refractor lens drive motor B1.

(*c*) Aux B+ from limit switch S5 is applied through relay contacts 2-3 to refractor lens drive motor B1. The motor starts to rotate clockwise (cw) and causes the refractor lens to move toward the front of the xenon lamp.

(*d*) Cams 5 and 6 are attached to the refractor lens. When the refractor lens is behind the xenon lamp, cam 6 holds limit switch S6 in the

open (NO) position. As the refractor lens starts to move toward the front of the xenon lamp, cam 6 releases from limit switch S6 and the switch returns to the closed (NC) position.

NOTE

Limit switch S6 was disconnected from the motor circuit when refractor control relay K9 was energized. Limit switch S6, therefore, has no effect on the motor circuit when it returns to the closed (NC) position; however, it places the limit switch in the proper position to move the refractor lens to the rear of the xenon lamp when wide beam operation is no longer required; mode SELECTOR SWITCH S2 is set out of the IR WIDE or VIS WIDE position.

(*e*) When the refractor lens reaches its proper position in front of the xenon lamp, cam 5 attached to the refractor lens actuates limit switch S5 and causes it to switch and be held in the open (NO) position. Limit switch S5 removes aux B+ (28 volts dc) and connects ground to refractor lens drive motor B1. The removal of aux B+ and the grounding of both sides of the motor brakes the motor to a stop.

(*f*) With the refractor lens positioned in front of the xenon lamp, the searchlight emits a wide beam of either infrared or visible light.

(7) Setting mode SELECTOR SWITCH S2 out of the IR WIDE or VIS WIDE position removes the refractor control voltage (28 volts dc) from refractor control relay K9. The relay becomes deenergized and the following occurs:

(*a*) Relay contacts 1-3 close. Ground is connected to the top of refractor lens drive motor B1 and limit switch S5 is disconnected from the motor circuit.

(*b*) Relay contacts 5-7 close. Ground is removed from the motor circuit and limit switch S6 is connected to the bottom of refractor lens drive motor B1.

(*c*) Aux B+ from limit switch S6 is applied through relay contacts 5-7 to refractor lens drive motor B1. Voltage polarity across the motor is reversed and the motor starts to rotate ccw. This condition causes the refractor lens to move toward the rear of the xenon lamp.

(*d*) When the refractor lens is in front of the xenon lamp, cam 5 holds limit switch S5 in the open (NO) position. As the refractor lens starts to move toward the rear of the xenon lamp, cam 5 releases from limit switch S5 and the switch returns to the closed (NC) position.

NOTE

Limit switch S5 is disconnected from the motor circuit when refractor control relay K9 is deenergized. Limit switch S5, therefore, has no effect on the motor circuit when it returns to the closed (NC) position; however, it places the limit switch in the proper position to move the refractor lens to the front of the xenon lamp when wide beam operation is required; that is, when m le SELECTOR SWITCH S2 is set to either IR WIDE or VIS WIDE.

(*e*) When the refractor lens reaches its proper position behind the xenon lamp, cam 6 attached to the refractor lens actuates limit switch S6 and causes it to switch and be held in the open (NO) position. Limit switch S6 removes aux B+ and connects ground to refractor lens drive motor B1. The removal of aux B+ and the grounding of both sides of the motor brakes the motor to a stop.

(*f*) With the refractor lens in its normal position, the searchlight emits a focused beam of either infrared or visible light.

2-23. Blower Motor Circuit Function

a. AN/VSS-1 (fig. 2-12).

(1) When the main power switch is set to ON, aux B+ (28 volts dc) is applied through the relay panel assembly to normally open thermal switch S7 and to relay contacts 3 and 10 of blower motor relay K12. When the main power relay is operated, B+ (28 volts dc) is applied through CR1 to blower motor relay K12. The relay operates and applies aux B+ through relay contacts 3, 10, and 2, 9, to blower motor B4; blower motor B4 operates. The motor is placed into operation at the same time that the xenon lamp is ignited and illuminated.

(2) If the searchlight is operated for at least 3 to 4 minutes, the xenon lamp causes the temperature of the air surrounding it to exceed 140 degrees F and thermal switch S7 closes. Aux B+ is applied to pin 4 at K12 through relay contacts 5 and 6. This condition has no effect on the operation of

blower motor relay K12, provided that the main power relay remains operated.

(3) When xenon lamp illumination is no longer required, the main power relay restores and B+ (28 volts dc) is removed from blower motor relay K12; however, aux B+ from thermal switch S7 is already applied to pin 4 of blower motor relay K12. The relay remains operated and blower motor B4 remains operative. When the temperature of the air surrounding the xenon lamp decreases to 130 degrees F, thermal switch S7 opens, aux B+ is removed from pin 4 of blower motor relay K12, and the relay restores. Relay contacts 2, 9 and 3, 10 open, aux B+ is removed from the blower motor, and the blower motor stops. Diode CR1 is a dc blocking diode which prevents transients on the B+ line from affecting the operation of blower motor relay K12. Capacitor C11 and diode CR8 provide ac filtering for blower motor B4.

(4) The heat exchanger is a mechanical device and operates as described in paragraph 2—9*b*.

b. AN/VSS—1A through —E, AN/VSS—2, AN/GSS—14(*) and AN/GSS—18(*) (fig. 2—13).

(1) When the main power switch is placed at ON, aux B+ (28 volts dc) is applied to thermal switch S7. When the searchlight is initially turned on, thermal switch S7 is open; therefore, aux B+ applied to it serves no function. When the main power relay is operated, B+ (28 volts dc) is applied through diode CR2 to blower motor B4 and causes it to operate. The motor is placed into operation at the same time the xenon lamp is ignited and illuminated.

(2) If the searchlight is operated for at least 3 to 4 minutes, the xenon lamp causes the temperature of the air surrounding it to exceed 140 degrees F, which closes thermal switch S7; aux B+ is applied to the blower motor. This has no effect on the operation of blower motor B4.

(3) When xenon lamp illumination is no longer required, the main power relay is restored, and B+ (28 volts dc) is removed from blower motor B4. However, aux B+ from closed thermal switch S7 has already been applied to the blower motor and the motor continues to operate. When the temperature of the air surrounding the xenon lamp decreases to 130 degrees F, thermal switch S7 opens, aux B+ is removed from the blower motor, and the motor stops. Diode CR2 is a dc blocking diode which prevents transients on the B+ line from affecting the operation of blower motor B4. Capacitor C11 is an ac bypass component.

(4) The heat exchanger is a mechanical device and operates as described in paragraph 2—9*b*.

2-24. Mount, Searchlight 3900A/GSS-14

The universal mount (A) is used to mount a 23-inch, 2.2-kw xenon searchlight to a truck or tower. The universal mount (A) routes power and control signals to the universal control box and searchlight and provides for positioning the searchlight in azimuth and elevation.

a. Circuit Function (fig. 2—14). The circuits of the universal mount (A) consist of illumination circuits for the scales and routing circuits that are used by the universal control box and searchlight. The universal mount (A) receives 28 volts dc from the power source at jack J4, pins A and B. Power is routed through the universal mount (A) to the universal control box through plug P1 pins A and B. Twenty-eight volts dc is also applied to switch S5 through fuse F1 and resistor R1. When power is present at the input and switch S5 is on, 28 volts dc is applied to lamps DS2 through DS6. The lamps illuminate the azimuth and elevation scales and the levels. When the universal mount (A) is used to mount the searchlight to a vehicle, the ground connection for the main power relay in the universal control box is routed through the override switch and universal mount (A), from plug P3, pin A, to jack J5, pin A, to the engine oil pressure switch of the vehicle.

b. Elevation Positioning (fig. 2—15). The elevation handwheel is used to position the searchlight from -700 to +1400 mils in elevation. The elevation geartrain provides a 40 to 1 reduction to permit the searchlight to be positioned with a minimum of effort. The handwheel drives the worm gear, which in turn causes the final gear to turn and position the searchlight.

c. Elevation Brake (fig. 3—22). The elevation brake is used to secure the searchlight in elevation. When the elevation brake is tightened, (turned clockwise) the asbestos disc secured to the left elevation plate assembly is forced against the yoke (not shown), securing the searchlight in position.

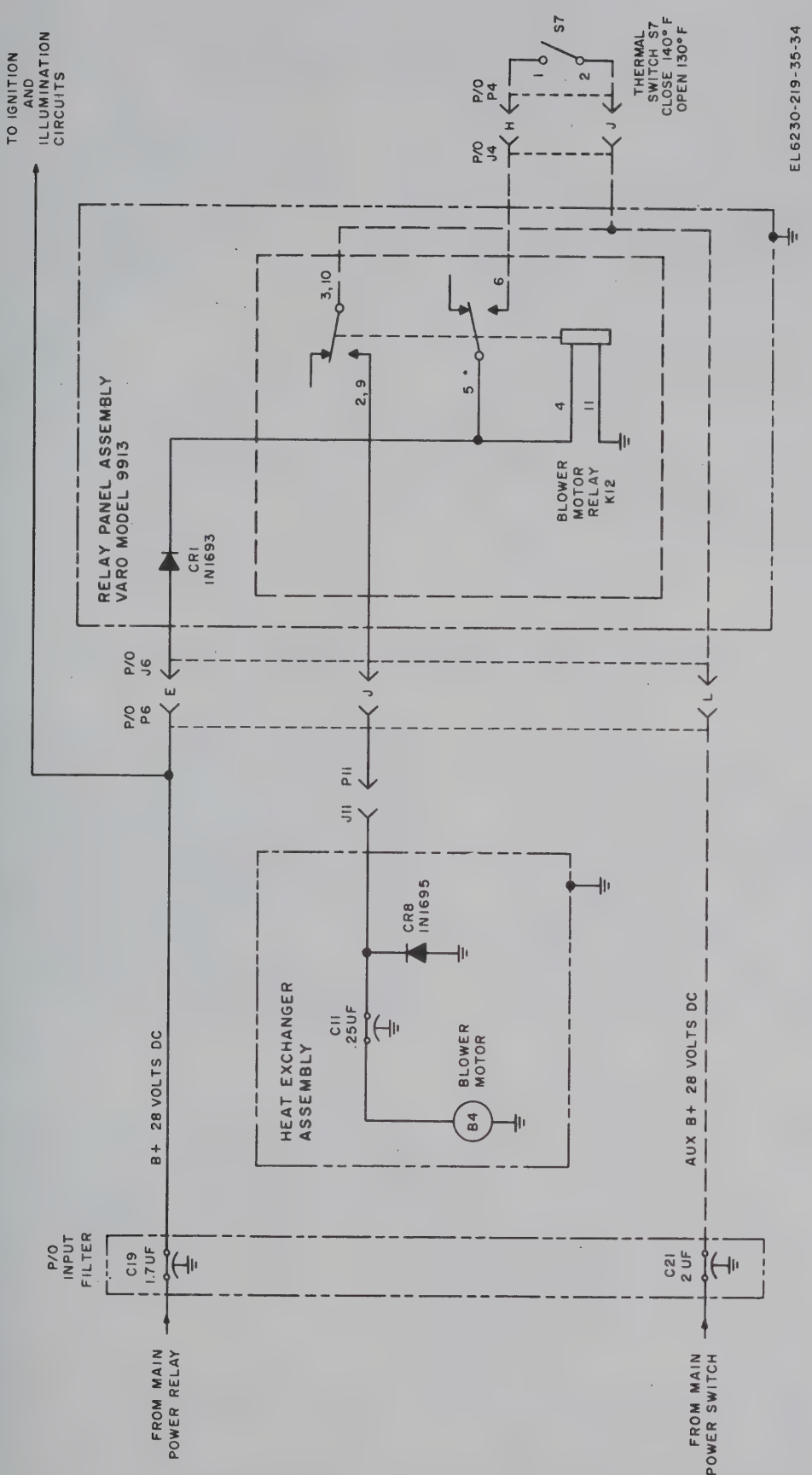


Figure 2–12. AN/VSS–1, blower motor circuit, simplified schematic diagram.

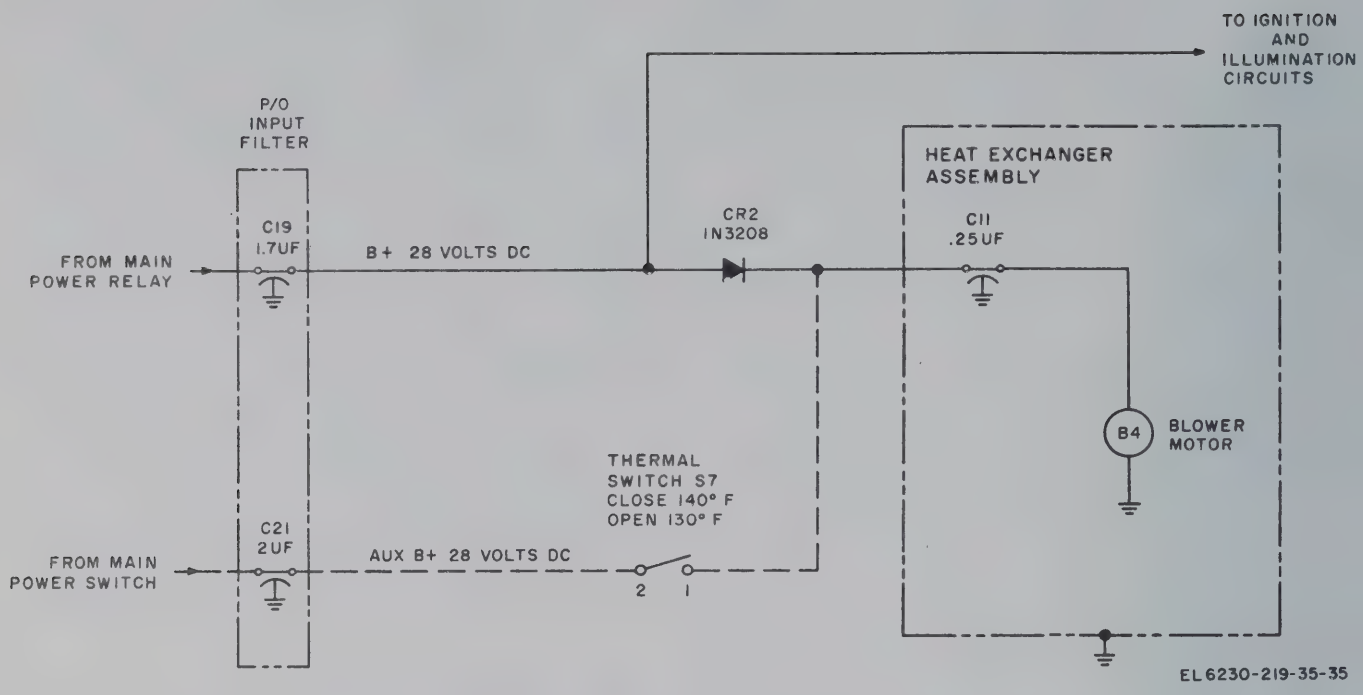


Figure 2—13. AN/VSS—1A through —E, AN/VSS—2, AN/GSS—14(*), and AN/GSS—18(*), blower motor circuit, simplified schematic diagram.

d. Azimuth Positioning (fig. 2—16). The azimuth positioning system provides for mechanical or manual positioning of the searchlight. The azimuth engagement lever determines which method is used. When the azimuth engagement lever is horizontal and the azimuth handwheel is turned, the motion is transmitted through the final gear to turn the friction wheel. The azimuth gearbox is mounted to a pivot screw so that the gearbox, including the friction wheel, may be moved in and out. This movement is controlled by a cam on the engagement lever. When the engagement lever is vertical, the gear block is allowed to swing back and the friction wheel does not touch the friction ring. In this condition the handwheel will not turn the searchlight; the searchlight is rotated manually. When the engagement lever is turned to the horizontal position, the cam forces the gearbox forward and the friction wheel is pressed against the friction ring. When the friction wheel turns, it travels along the race and causes the yoke, and the searchlight on it, to turn.

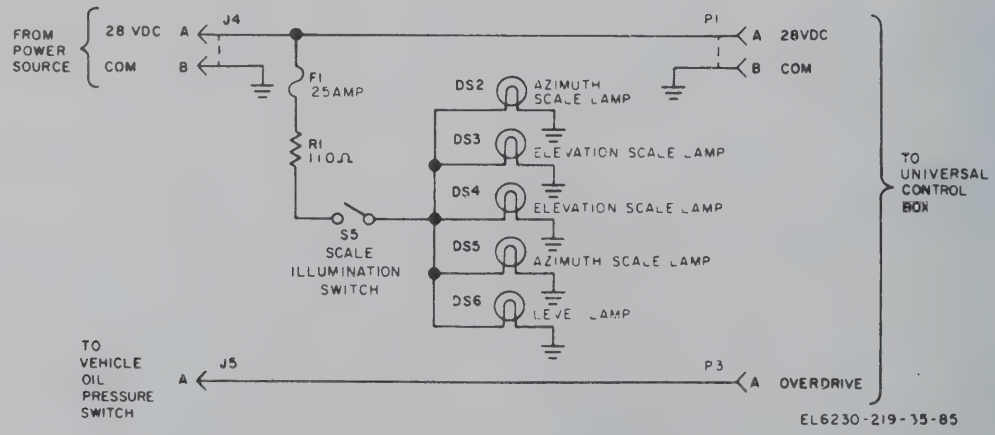


Figure 2—14. Universal mount (A), illumination and routing circuits.

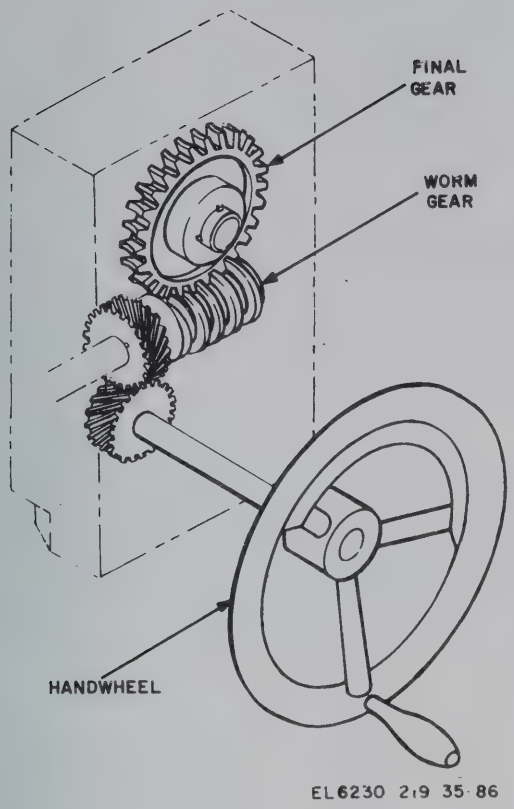


Figure 2—15. Elevation positioning system.

2–25. Mount, Universal MT–3900/GSS–14

The universal mount is used to mount a 23-inch, 2.2 KW searchlight to a vehicle or tower. The universal mount provides for manual positioning of the searchlight in azimuth and elevation; it does not contain any electrical circuits.

a. Elevation Positioning. The searchlight is manually positioned in elevation by grasping the tortion bar and moving the searchlight in the desired direction.

b. Elevation Brake. Two elevation brakes are used to secure the searchlight in elevation. When the elevation brakes are tightened (handwheels turned clockwise), pressure is exerted against the yoke securing the searchlight in position.

c. Azimuth Positioning. The searchlight is manually positioned in azimuth by grasping the tortion bar and rotating the searchlight in the desired direction.

d. Azimuth Brake. The azimuth brake is used to secure the searchlight in azimuth. When the handbrake control knob is tigntened (turned clockwise), pressure is exerted against the pedestal race securing the searchlight in position.

2–26. Shockmount Assembly

The mount used with the AN/VSS—1(*) and AN/VSS—2 is part of the tank. The AN/VSS—1(*) and AN/VSS—2 are equipped with a shockmount assembly which is part of the searchlight subassemblies. It consists of three ball-socket hitches for mounting the searchlight subassemblies to the tank, and two tortion bars which protect the searchlight subassemblies from excessive stresses during gunfire.

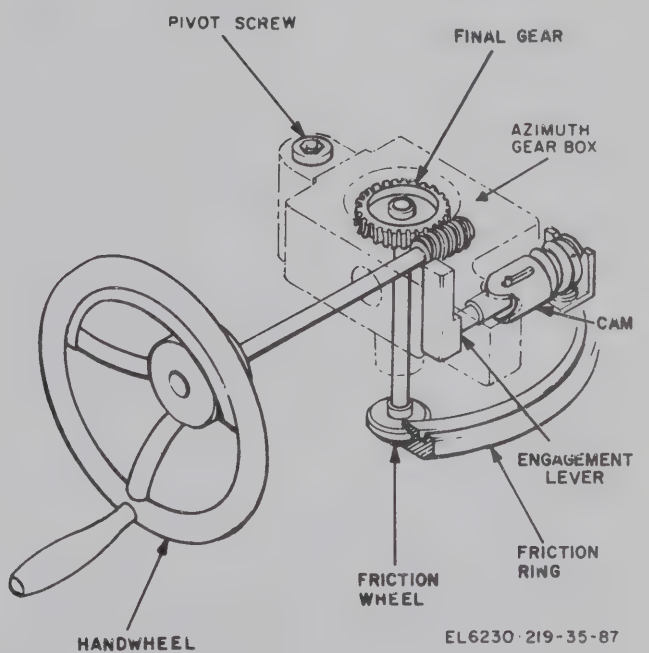


Figure 2—16. Azimuth positioning system operation.

CHAPTER 3
DIRECT SUPPORT MAINTENANCE

Section I. GENERAL

3-1. Scope

This chapter supplements all procedures outlined for organizational maintenance (TM 11—6230—219—12). It includes instructions appropriate to third echelon for troubleshooting, testing, and repairing the searchlight; replacing maintenance parts; and repairing specified maintenance parts. It also lists tools, test equipment, and materials required for third echelon maintenance.

3-2. Tools, Test Equipment, and Materials Required

Tools, test equipment, and materials required for direct support maintenance are listed below:

Item	*Common name*	*Purpose*	*Applicable publication*
Crimping tool	Crimping tool	Cable and wire repair	
Extension, socket wrench 12 in. long, 3/8-in. drive	Extension	Removal, replacement, adjustment	
Handle, socket wrench 3/8-in. drive	Handle	Removal, replacement, adjustment	
Multimeter TS—352/U	Multimeter	Measure voltage and resistance	TM 11—6625—366—15
Pliers, retaining ring Truarc #34	Truarc pliers	Disassembly and reassembly	
Power Supply PP—4606/G	Power supply	Test setup power supply	TM 11—6130—243—12
Screwdriver, flat tip, 8 in. long, 3/8-in. tip	Screwdriver	Removal, replacement, adjustment	
Shield, face	Face shield	Protection of personnel	
Socket, socket wrench, 3/8-in. drive, 9/16-in. opening	Socket	Removal, replacement, adjustment	
Socket wrench attachment, socket head screw, 3/8-in. drive, 5/32-in. hex head	Socket wrench attachment	Removal, replacement, adjustment	
Test Set, Search AN/GSM—182	Test set	Bench test	TM 11—6625—1580—12
Tool Kit TK—100/G	Tool kit	Repair electronic circuits	SB 11—604
Cleaning Compound	Cleaning compound	Clean mechanical parts	
Retaining Compound MIL—R—46802	Sealant	Seal moving mechanical parts	
Grease MIL—G—23827	Grease	Lubricate moving mechanical parts	
Forklift crane or equivalent	Forklift	Position searchlight on the yoke	
Level	Level	Level alignment	
Cleaning, lint-free cloth	Cleaning cloth	Cleaning	
Sealant, per MIL—R—46808, Grade AA	Sealant	Seal mechanical parts	
Crocus cloth	Crocus cloth	Polish metal surfaces	
11/16"Spanner wrench	Spanner wrench	Adjustment of limit switches	

Section II. MAINTENANCE TECHNIQUES

3-3. Organization of Troubleshooting Techniques

a. General. Troubleshooting the searchlight is performed in three steps. The first step, sectionalization, is to trace the fault to the searchlight subassembly, control box, or mount. The second step, localization, is to trace the trouble to a defective assembly or associated cabling or wiring. When performing bench maintenance on a removed assembly, localization includes tracing the fault to a defective stage within the assembly. The third step, isolation, is to isolate the trouble within the assembly to a defective part.

b. Sectionalization. Listed below is a group of tests arranged to reduce unnecessary work and to aid in tracing trouble to the searchlight subassembly, control box, or mount.

(1) *Visual inspection.* Visual inspection is used to locate faults before operating or testing circuits. The seating of all component connectors, connections to switches and circuit breakers, and connections on terminal boards should be observed and an attempt made to locate the fault.

(2) *Operational tests.* Operational tests frequently indicate the general location of trouble. In many instances, the tests will help in determining the exact nature of the fault. Paragraph 3—62 prescribes a searchlight operational test.

c. Localization. The procedures listed below are used for localizing troubles.

(1) *Starting procedures.* The starting, standby, and stopping procedures (TM 11—6230—219—12) are used in conjunction with the troubleshooting charts to locate faulty components.

(2) *Voltage and resistance measurements.* Use the voltage and resistance charts (para 3—13) to find normal readings, and compare them to the actual readings taken.

(3) *Troubleshooting charts* (para 3—8, 3—9, and 3—10). The troubleshooting charts, with troubles and symptoms, will aid in localizing the trouble to an assembly or component. If the corrective measures indicated do not restore normal equipment operation, troubleshooting the cabling (para 3—16) may be necessary. When the trouble is isolated to an assembly, remove the assembly from the searchlight and replace it with an assembly known to be in good working order. Note on the repair tag how the equipment performed and what corrective measures were taken.

(4) *Intermittent troubles.* In all tests, the possibility of intermittent troubles should not be overlooked. If present, this type of trouble often may be made to appear by lightly tapping or jarring the equipment and checking wiring and connections to components (para 3—16).

(5) *Test Set, Searchlight AN/GSM—182 field support.* The AN/GSM—182 is a portable test set used to troubleshoot all models of the 2.2-kw xenon searchlight. The test set is designed to allow easy connection to the searchlight. Necessary functions have been included for localizing problems to subassemblies in the complete searchlight assembly through visual display (lights, meters, etc). Refer to TM 11—6625—1580—12 for operating instructions.

d. Isolation. After the trouble has been localized (*c* above) the methods below will aid in isolating trouble to a defective circuit element within the component.

(1) *Voltage measurements.* The searchlight contains transistors. When measuring voltage, use tape or sleeving to insulate the entire test probe except for the extreme tip. A momentary short circuit can ruin a transistor.

(2) *Resistance measurements.* Make resistance measurements in this equipment only as directed. When using the multimeter, set it to the resistance range specified, otherwise the indication obtained will be inaccurate.

CAUTION

Direct support personnel are not authorized to repair printed circuit boards. Defective printed circuit boards will be referred to higher echelon for repair. Before using any multimeter to test transistors or transistor circuits by measuring resistances, check the open-circuit voltage across the multimeter test leads. Do not use the multimeter if the open-circuit voltage exceeds 1.5 volts. Also, since the RX1 range

normally connects the multimeter internal battery directly across the test leads, the comparatively high current (50 ma. or more) may damage the transistor under test. As a general rule, the RX1 range of any multimeter should not be used when testing low-power transistors.

3-4. Troubleshooting Aids

The following data is supplied to help the repairman rapidly locate trouble.

a. Overall Block Diagram (fig. 2—1). The block diagram gives the electrical and mechanical interrelationship among the assemblies of the searchlight. By observing the symptoms and reasoning possible causes, it is often possible to trace the cause of faulty operation to a particular block (assembly).

b. Searchlight Modes of Operation Diagram (fig. 2—2). This diagram will aid the repairman in determining the proper position of the IR or pink filter, refractor lens, and blackout shield in the various modes of operation.

c. Simplified Schematic Diagrams (fig. 2—3 through 2—14). These diagrams are functional segments of larger circuits and can be used to trace trouble in circuits more easily than with the complete schematic diagrams.

d. Mechanical Function Illustrations (fig. 2—15 and 2—16). These illustrations provide the repairman with a clear concept of the mechanical operation of Mount, Searchlight MT—3900A/GSS—14 and can be used to analyze troubles in the azimuth and elevation positioning systems.

e. Searchlight Subassembly Parts Location Diagram (fig. 3—1). The bulk of the searchlight circuitry is located in the searchlight subassembly. Figure 3—1 shows the location of the major electronic components of the searchlight subassembly. This illustration will help the repairman to rapidly locate test points specified in the searchlight subassembly troubleshooting chart (para 3—8) and to requisition required parts.

f. Adjustment Illustrations (fig. 3—2 and 3—3). Frequently, trouble can be corrected by making the proper adjustments. Figure 3—2 illustrates how to make the limit switch adjustments. Figure 3—3 shows how to make the cowling latch adjustments.

g. Removal and Replacement Procedure Illustrations (fig. 3—4 through 3—35). Rapid location of test points is essential to the speedy repair of equipment. These figures not only illustrate how to remove and replace certain components, they are also a valuable source of information for parts locations, in addition to test point locations.

h. Resistor and Capacitor Color Code Diagrams (fig. 6—1 and 6—2). These diagrams are provided to aid maintenance personnel in determining the value, voltage rating, and tolerance of resistors and capacitors.

i. Complete Schematic Diagrams (fig. 6—3 through 6—9). A complete schematic diagram is provided for each model of the searchlight. These diagrams show all of the circuitry in the searchlight and can be used to determine the faulty part in a particular assembly.

j. Mode Control Circuits Functional Diagrams (fig. 6—10 through 6—12). These diagrams speed up troubleshooting by helping the repairman to more readily visualize the following functions:

(1) How the searchlight is turned on, off, or placed in standby.

(2) How the searchlight operates in any of its six modes of operation.

(3) How power is applied to the blower motor.

(4) How the control box indicator lamp lights when the searchlight is in the overdrive mode or the xenon lamp is overheated.

k. Wiring Diagrams (fig. 6—13 and 6—17). These diagrams show the interconnections between components of the searchlight. They show the wiring between terminal boards and receptacles in one assembly to the terminal boards and receptacles in another assembly. These diagrams are especially useful for tracing trouble between assemblies.

3-5. Troubleshooting Precautions

a. Warning Notices. Failure to observe the following precautions may result in DEATH or INJURY.

(1) Do not touch the xenon lamp with bare hands while it is hot.

(2) Do not look directly at the xenon lamp when it is lit without first protecting the eyes with welders goggles or a piece of smoked glass.

(3) Always wear a face shield when removing the xenon lamp.

(4) Use extreme care in handling the high-pressure xenon lamp. Avoid making contact with the quartz envelope.

(5) Keep clear of the searchlight during testing.

(6) Always set the main power switch to OFF before connecting or disconnecting cables.

(7) Shut off searchlight power prior to performing resistance checks.

(8) Discharge capacitors before making checks. Beware of exposed capacitors.

(9) Disconnect the leads from terminal 2 of CB1 on the relay panel assembly before attempting to make voltage measurements. This condition will prevent the ignition circuit from operating when power is applied to the searchlight. Do not leave searchlight power on for more than 30 seconds out of any 2-minute period under this condition.

(10) Never test the igniter by jumping a spark from the high-voltage cable to the chassis of the searchlight. Besides setting up a carbon track across the igniter output, this action can result in DEATH.

b. Caution Notices. Failure to observe the following precautions may result in damage to the searchlight and/or associated test equipment:

(1) Ensure that all connections are tight before testing.

(2) Do not operate the searchlight if the blower motor does not operate.

(3) Never turn off the main power switch until the blower has stopped.

(4) Do not operate the searchlight in overdrive for more than 15 seconds in any 5-minute period. Wait 10 minutes between "bursts" of overdrive.

(5) Place the SEARCHLIGHT power switch at OFF if a malfunction occurs which causes the searchlight to remain in the overdrive mode of operation beyond the normal timing sequence.

Section III. DIRECT SUPPORT TROUBLESHOOTING

3-6. General

a. The purpose of the troubleshooting procedures is to isolate the malfunction to those components and assemblies listed below:

(1) Igniter assembly

(2) Converter assembly

(3) Relay panel assembly

(4) Heat exchanger assembly

(5) Blower assembly

(6) Control Box assembly

(7) Xenon lamp housing assembly with drive motors

(8) Xenon lamp

(9) Converter relay K14

(10) Overdrive relay K2

(11) Thermoswitch S7

(12) Mount

b. Once the faulty component or assembly is located, it is removed and replaced as described in section IV. The faulty component or assembly is forwarded to higher echelon for repair. If the malfunction cannot be isolated to the components or assemblies listed above, the complete searchlight or searchlight subassembly as applicable is forwarded to higher echelon for repair.

c. Voltage and resistance checks will be used to isolate malfunctions with the exception of the ignition circuit (igniter, converter, and lamp assemblies). When the malfunction is isolated to the ignition circuit, all assemblies within the circuit

will be replaced simultaneously unless specifically directed to do otherwise.

CAUTION

Disconnect the leads from terminal 2 of CB1 on the relay panel assembly before attempting to make voltage measurements. This will prevent the ignition circuit from operating when power is applied to the searchlight. Shut off searchlight power prior to performing resistance checks.

3-7. Symptom Troubleshooting

a. Troubleshooting charts will be used by direct support repairmen to troubleshoot the searchlight with all components interconnected.

b. The symptoms that are listed in the charts are those which would be observed by the searchlight operator during operation. Each symptom gives procedures necessary to isolate the trouble. The procedures are listed in the order in which they should be performed.

c. Prior to using the charts, accomplish the following:

(1) Remove cowling assembly (para 3—23).

(2) Remove lamp cover (para 3—24).

(3) Remove xenon lamp (para 3—25).

(4) Remove primary reflector (para 3—26).

(5) Replace xenon lamp (para 3—25).

(6) Replace lamp cover (para 3—24).

WARNING

Be sure to observe the precautions listed in paragraph 3—5. If these precautions are not observed, DEATH or INJURY to personnel is possible and/or serious damage to equipment may occur.

3-8. Searchlight Subassembly Troubleshooting Chart

Item No.	*Symptom*	*Probable trouble*	*Corrective action*
1	Xenon lamp does not light; blower motor operates; searchlight will change modes.	*a.* Improper engine operation (AN/GSS—14(*) and AN/GSS—18(*) only)	*a.* Arrange with vehicle maintenance personnel to check engine operation.
		b. Defective oil pressure switch (AN/GSS—14(*) and AN/GSS—18(*) only)	*b.* Check continuity between OFF position of emergency override switch and ground. Arrange with vehicle maintenance personnel to replace defective oil pressure switch.
		c. Defective CB1 on relay panel	*c.* Check CB1 for continuity. Replace defective CB1 (para 3—43).
		d. Defective control box	*d.* Substitute another control box. Troubleshoot defective control box (para 3—11 and 3—12).
		e. Open relay panel wiring	*e.* On relay panel Varo model 9913, check continuity between pin N of P6 on relay panel and terminal X1 of K14. On relay panels Varo model 9922 and Melpar model F40015, check continuity between pin M of P3 on relay panel and terminal X1 of K14. Repair or replace defective wiring.
		f. Defective relay K14	*f.* Disconnect terminal X1 or X2 from K14. Check continuity between terminals X1 and X2.

Item No.	Symptom	Probable trouble	Corrective action
			If meter reading indicates open circuit, replace K14 (para 3—34).
		g. Open cabling or input filter capacitor C19	*g.* Check continuity between terminal A1 of relay K14 and pin A of J2. Repair or replace defective cabling or replace C19.
		h. Defective relay panel assembly	*h.* Substitute with another relay panel assembly. Refer defective relay panel assembly to higher echelon maintenance for repair.
		i. Defective igniter, converter, or xenon lamp	*i.* Measure voltage at terminal 2 on CB1 of the relay panel. This should be 28 volts dc. Disconnect and check continuity of wires No. W1, W2, and W3 from converter to igniter. If continuity checks are satisfactory, substitute with another igniter, converter, and xenon lamp in turn. Refer defective component to higher echelon for repair. If symptom persists, refer searchlight subassembly to higher echelon for repair.
2	Xenon lamp does not ignite but flashes at 3-second intervals.	*a.* Defective xenon lamp	*a.* Substitute with another xenon lamp. Refer defective xenon lamp to higher echelon for repair (para 3—15).
		b. Open wire No. W1	*b.* Measure voltage at C12 on igniter assembly and terminal 3 of TB1 on converter assembly. This should be 50 to 60 volts dc. If voltage is present at terminal 3 of TB1 but not at C12, replace wire No. W1. If voltage is not present or is low at either test point, replace the converter assembly. Refer defective converter assembly to higher echelon for repair.
		c. Defective heat exchanger assembly (CR10 or R19)	*c.* Disconnect wires on terminal 2 of CB1 on relay panel assembly. Measure voltage at terminal 1 of ballast resistor R19 on heat exchanger assembly. If 28 volts dc is present, replace heat exchanger assembly. Refer defective heat exchanger assembly to higher echelon for repair. If voltage is not present, proceed to *d* below.
		d. Defective ignition circuit	*d.* Replace converter and igniter assemblies in turn. Refer defective assembly to higher echelon for repair. If symptom persists, refer searchlight subassembly to higher echelon for repair.
3	Xenon lamp ignites but flashes bright at 3-second intervals.	Defective relay panel assembly	Substitute with another relay panel assembly. Refer defective relay

Item No.	Symptom	Probable trouble	Corrective action
			panel assembly to higher echelon for repair. If symptom persists, refer searchlight subassembly to higher echelon for repair.
4	Xenon lamp ignites but flashes dim at 3-second intervals.	Defective xenon lamp	Substitute with another xenon lamp. Refer defective xenon lamp to higher echelon for repair (para 3—15). If symptom persists, refer searchlight subassembly to higher echelon for repair.
5	Xenon lamp lights but will not go into wide beam operation when mode SELECTOR SWITCH is set to VIS WIDE.	*a.* Defective control box	*a.* Substitute with another control box. Troubleshoot defective control box (para 3—11 and 3—12).
		b. Defective relay panel assembly	*b.* Substitute with another relay panel assembly. Refer defective relay panel assembly to higher echelon for repair.
		c. Open wire between relay panel assembly and refractor lens mode limit switch	*c.* Check continuity of wire No. W49 connected between the NC terminal of mode limit switch S5 and Pin S of P3 on relay panel assembly (Varo model 9922 and Melpar model F40015), or pin S of P4 on relay panel assembly (Varo model 9913). Repair or replace defective wiring.
		d. Open wire between relay panel assembly and the control box	*d.* On searchlights using relay panel assemblies Varo model 9922 and Melpar model F40015, check continuity of wire No. W24 connected between pin J of P3 on relay panel assembly and pin H of searchlight input power receptacle J2. Repair or replace defective wiring. On searchlights using relay panel assembly Varo model 9913, check continuity between pin C of P6 on the relay panel and pin H of P1 on the external harness (Cable Assembly, Power, Electrical CX—10729/VSS—1). Replace defective cable assembly. Refer defective cable assembly to higher echelon for repair.
		e. Defective refractor lens drive motor	*e.* Replace refractor lens drive motor. Refer defective motor to higher echelon for repair. If symptom persists, refer searchlight subassembly to higher echelon for repair.
6	Xenon lamp lights; searchlight will not go out of blackout mode of operation when mode SELECTOR SWITCH is out of BO position. *Note.* Be sure mode SELECTOR SWITCH is out of BO position when troubleshooting this item.	*a.* Defective control box	*a.* Substitute with another control box. Troubleshoot defective control box (para 3—11 and 3—12).

Item No.	Symptom	Probable trouble	Corrective action
		b. Defective relay panel assembly	*b.* Substitute with another relay panel assembly. Refer defective relay panel assembly to higher echelon for repair.
		c. Open wire between relay panel assembly and blackout mode limit switch	*c.* Check continuity of wire No. W47 between the NC terminal of limit switch S3 and pin R of P3 on relay panel assembly (Varo model 9922 and Melpar model F40015), or pin P of J4 on relay panel assembly (Varo model 9913).
		d. Open wire between relay panel assembly and control box	*d.* On searchlights using relay panel assemblies Varo model 9922 and Melpar model F40015 check continuity of wire No. W23 connected between pin F of P3 on relay panel assembly and pin F of searchlight input power receptacle J2. Repair or replace defective wiring. On searchlights using relay panel assembly Varo model 9913, check continuity between pin B of P6 on the relay panel and pin F of P1 on the external harness (Cable Assembly, Power, Electrical CX—10729/VSS—1). Replace defective cable assembly. Refer defective cable assembly to higher echelon for repair.
		e. Defective blackout shield drive motor	*e.* Replace blackout shield drive motor. Refer defective motor to higher echelon for repair. If symptom persists, refer searchlight subassembly to higher echelon for repair.
7	Xenon lamp lights, searchlight will not go into infrared mode of operation when mode SELECTOR SWITCH is set to IR WIDE position.	*a.* Defective control box	*a.* Substitute with another control box. Troubleshoot defective control box (para 3—11 and 3—12).
		b. Defective relay panel assembly	*b.* Substitute with another relay panel assembly. Refer defective relay panel assembly to higher echelon for repair.
		c. Open wire between relay panel assembly and IR filter mode limit switch	*c.* Check continuity of wire No. W45 between NC terminal of mode limit switch S1 and pin P of P3 on relay panel assembly (Varo model 9922 and Melpar model F40015), or pin M of J4 on relay panel assembly (Varo model 9913). Repair or replace defective wiring.
		d. Open wire between relay panel assembly and control box	*d.* On searchlights using relay panel assemblies Varo mode 9922 and Melpar model F40015, check continuity of wire No. W22 connected between pin D

Item No.	Symptom	Probable trouble	Corrective action
			of P3 on relay panel assembly and pin E of searchlight input power receptacle J2. Repair or replace defective wiring. On searchlights using relay panel assembly Varo model 9913, check continuity between pin A of P6 on the relay panel and pin E of P1 on the external harness (Cable Assembly, Power, Electrical CX—10729/VSS—1). Replace defective cable assembly. Refer defective cable assembly to higher echelon for repair.
		e. Defective IR filter drive motor	*e.* Replace IR filter drive motor. Refer defective motor to higher echelon for repair. If symptom persists, refer searchlight to higher echelon for repair.
8	Xenon lamp ignites; blower motor does not operate	*a.* Open wire	*a.* On searchlights using relay panel assembly (Varo model 9922 and Melpar model F40015), check for open wire between CR2 on relay panel assembly and pin A of input power receptacle J2. Check for open wire between CR2 on relay panel assembly and C11 on heat exchanger assembly (wire No. W18). On searchlights using relay panel assembly (Varo model 9913), check for open wire between pin J of P6 on relay panel assembly and P11 on heat exchanger assembly. Repair or replace defective wiring.
		b. Defective CR2 on relay panel assembly (Varo model 9922 and Melpar model F40015)	*b.* Measure voltage at cathode of CR2 on relay panel; 28 volts dc should be present. If no voltage is present, replace CR2.
		c. Defective blower motor brushes	*c.* Replace blower motor brushes (para 3—44)
		d. Defective blower assembly	*d.* Disconnect lead to C11 (wire No. W18) on blower assembly and measure dc resistance to ground. (Place positive lead on C11 terminal and negative lead on ground.) Resistance reading should be approximately 10 to 40 ohms. If reading indicates an open or short, replace blower assembly. Refer defective blower assembly to higher echelon for repair. If symptom persists, refer searchlight subassembly to higher echelon for repair.
9	Searchlight operates properly ex-	*a.* Defective control box	*a.* Measure resistance at pin B of P2

Item No.	Symptom	Probable trouble	Corrective action
	cept it will not go into overdrive mode of operation.		on control box to ground while operating OVERDRIVE control. Resistance should be 0 ohm. If an open circuit is indicated, replace control box. Troubleshoot control box (para 3—11 and 3—12).
		b. Defective relay panel assembly	*b.* Substitute with another relay panel assembly. Refer defective relay panel assembly to higher echelon for repair.
		c. Wire shorted to ground	*c.* Check NC terminal of thermal switch S8, terminal X2 of relay K2, and pin B of J2 for wires shorted to ground. Repair or replace defective wiring. If symptom persists, refer searchlight subassembly to higher echelon for repair.
10	Searchlight operates properly except blower motor does not operate after searchlight has been turned off.	*a.* Open wire	*a.* Check for continuity between thermal switch S7 located in lower elbow and C11 on the blower assembly. Check for continuity between S7 and terminal X2 of relay K2. Repair or replace defective wiring.
		b. Defective thermal switch S7	*b.* Replace thermal switch S7 (para 3—36). If symptom persists, refer searchlight subassembly to higher echelon for repair.
11	Searchlight leaks visible light in BO and IR modes of operation, or shadows are reflected on primary reflector.	Mode limit switches improperly adjusted	Refer to para 3—17.
12	Searchlight operation interferes with nearby radio communications.	Leaky or shorted capacitors in radio interference suppression components (input filter)	Refer to para 3—33.

3–9. Mount, Universal MT–3900/GSS–14 Troubleshooting Chart

Item No.	Symptom	Probable trouble	Corrective action
1	Searchlight cannot be positioned in elevation or is extremely difficult to position.	*a.* Elevation brake is on. *b.* Elevation shaft or nylon friction plates worn.	*a.* Loosen elevation brake. *b.* Refer to TM 11—2300—351—15—3.
2	Searchlight cannot be positioned in azimuth or is extremely difficult to position.	*a.* Azimuth brake is on. *b.* Worn phenolic ball bearings.	*a.* Loosen azimuth brake. *b.* Refer to TM 11—2300—351—15—3.
3	Azimuth and elevation brakes slip.	Worn brake linings.	Refer to TM 11—2300—351—15—3.

3–10. Mount, Searchlight MT–3900A/GSS–14 Troubleshooting Chart

Item No.	Symptom	Probable trouble	Corrective action
1	Searchlight cannot be positioned in elevation or is extremely difficult to position.	*a.* Elevation brake is on. *b.* Elevation scales binding on yoke.	*a.* Loosen elevation brake. *b.* Straighten as required. Bearing blocks may require reshimming (para 3—48).

Item No.	Symptom	Probable trouble	Corrective action
		c. Improper lubrication of elevation gearbox.	c. Refer to higher echelon.
		d. Worn or broken gears in elevation gearbox.	d. Replace elevation gearbox (para 3—48).
2	Azimuth handwheel will not position the searchlight in azimuth.	a. Azimuth engagement lever not engaged.	a. Engage lever.
		b. Improper lubrication of azimuth gearbox.	b. Lubricate azimuth gearbox (para 3—55).
		c. Worn or broken gears in azimuth gearbox.	c. Replace azimuth gearbox (para 3—55).
		d. Azimuth friction wheel excessively worn.	d. Replace azimuth friction wheel (para 3—51 and 3—55).
		e. Bearing race inoperative.	e. Repair bearing race (para 3—57).
3	No power out to searchlight.	a. Power source inoperative.	a. Check power source for proper operation.
		b. Loose connectors.	b. Check all connectors. Tighten any found to be loose.
		c. Open wire in cable.	c. Check for continuity of cable (para 3—14). Repair or replace the cable harness as necessary (para 3—54).
4	Indicator light inoperative.	a. Burned out lamp.	a. Replace lamp.
		b. Open fuse.	b. Replace fuse.
		c. Switch S5 defective.	c. Replace switch S5 (para 3—52).
		d. Resistor R1 defective.	d. Replace resistor R1.

3–11. Control Box C–7163/VSS–1 Ohmmeter Check

Use the following chart in conjunction with figures 6—3 through 6—9 as applicable.

SEARCHLIGHT power switch position	Mode SELECTOR switch position	Wire No.	Test From	Test To	Resistance	Circuit	Remarks
All positions	All positions	GRD	Pin G	Ground	0	Box ground	Pull out on mode SELECTOR SWITCH knob for zero reading
		518H	Pin B	Pin G	0	Overdrive switch	
OFF	IR FOCUS	518F	Pin D	Pin A	Infinity	Refractor lens switch	
		518D	Pin D	Pin E	Infinity	IR filter switch	
	IR WIDE	518F	Pin D	Pin A	0	Refractor lens switch	
		518D	Pin D	Pin E	Infinity	IR filter switch	
	BO	518F	Pin D	Pin A	Infinity	Refractor lens switch	
		518D	Pin D	Pin E	Infinity	IR filter switch	
	VIS WIDE	518F	Pin D	Pin A	0	Refractor lens switch	
		518D	Pin D	Pin E	0	IR filter switch	
	VIS FOCUS	518F	Pin D	Pin A	Infinity	Refractor lens switch	
		518D	Pin D	Pin E	0	IR filter switch	
STANDBY	All positions	518C	Pin D	Pin C	0	Control box power	Mode SELECTOR SWITCH positions same as OFF above only use Pin C instead of Pin D
ON	All positions	518C	Pin D	Pin C	0	Control box power	Same as above
	IR FOCUS	518E	Pin D	Pin F	0	Blackout shield switch	

SEARCHLIGHT power switch position	Mode SELECTOR switch position	Wire No.	Test From	Test To	Resistance	Circuit	Remarks
	IR WIDE	518E	Pin D	Pin F	0	Blackout shield switch	
	BO	518E	Pin D	Pin F	Infinity	Blackout shield switch	
	VIS WIDE	518E	Pin D	Pin F	0	Blackout shield switch	
	VIS FOCUS	518E	Pin D	Pin F	0	Blackout shield switch	

3-12. Control Box C-7164/GSS-14 Ohmmeter Check

Use the following chart in conjunction with figure 6—15. Measure each wire listed for continuity. Repair or replace wires which indicate an open or short.

Measure continuity From	To	Wire No.
Pin A, J1	Terminal 1, CB1	W1
Pin B, J1	Ground	W26
Pin A, J2	Terminal 2, K5	W3
Pin B, J2	Terminal B, S2—1	W8
Pin C, J2	Terminal 1, DS1	W9
Pin D, J2	Terminal 2, CB2	W5
Pin E, J2	Terminal 33, S2—3	W13
Pin F, J2	Terminal 27, S2—4	W14
Pin G, J2	Ground	W10
Pin H, J2	Terminal 18, S2—2	W15
Ground	Neg terminal, C1	W28
Neg terminal, C1	Neg terminal, C2	W31
Pos terminal, C1	Pos terminal, C2	W30
Pos terminal, C1	Terminal 2, CB1	W29
Terminal 2, CB1	Terminal 1, K5	W2
Terminal 1, CB1	Terminal 1, S3	W4
Terminal 4, K5	Terminal 2, S4	W6
Terminal 3, K5	Terminal 1, S1	W7
Terminal 1, DS1	Terminal 2, S1	W11
Terminal 21, S2—4	Terminal 4, S1	W12
Terminal 2, DS1	Terminal B, S2—1	W16
Terminal 18, S2—2	Terminal 12, S2—2	W17
Terminal 27, S2—4	Terminal 28, S2—4	W18
Terminal 28, S2—4	Terminal 22, S2—4	W19
Terminal 22, S2—4	Terminal 23, S2—4	W20
Terminal 31, S2—3	Terminal 11, S2—2	W21
Terminal 32, S2—2	Terminal 33, S2—3	W22
Terminal 5, S1	Terminal 31, S2—3	W23
Terminal 1, S1	Terminal 1, S1	W24
Terminal 2, S3	Terminal 1, CB2	W25
Ground	Terminal A, S2—1	W27
Terminal 1, S4	Ground	W33

3-13. Voltage and Resistance Measurements

(fig. 6—3 through 6—9)

WARNING

Observe the precautions listed in paragraph 3—5 before making voltage measurements. The searchlight contains voltages which can cause INJURY or DEATH.

Unless otherwise directed, disconnect the leads from terminal 2 of CB1 on the relay panel assembly before attempting to make voltage measurements. This will prevent the ignition circuit from operating when power is applied to the searchlight. Do not leave the searchlight on for more than 30 seconds out of any 2-minute period under this condition. Shut off searchlight power prior to performing resistance checks.

a. Voltage Measurements.

Test point	Voltage (vdc)	Remarks
Terminal 2, CB1 on relay panel	22 to 30	
Terminal 1, R19 on heat exchanger	22 to 30	
C12 on igniter assembly	50 to 60	Wires must be reconnected to terminal 2 of CB1 on relay panel.
Terminal 3, TB1 on converter assembly	50 to 60	Same as above.
NC terminal, mode limit switch S5	22 to 30	Mode SELECTOR SWITCH in VIS WIDE position.
Pin J of P3 on relay panel assembly (Varo model 9922 and Melpar model F40015)	22 to 30	
Pin H of P2 on control box	22 to 30	
NC terminal, mode limit switch S3	22 to 30	Mode SELECTOR SWITCH out of BO position.
Pin F of P2 on control box	22 to 30	
NC terminal, mode limit switch S1	22 to 30	Mode SELECTOR SWITCH in IR WIDE position
Pin D of P3 on relay panel assembly (Varo model 9922 and Mel-	22 to 30	

Test point	Voltage (vdc)	Remarks
par model F40015)		
Pin E of P2 on control box	22 to 30	
Anode of CR2 located above relay panel assembly (Varo model 9922 and Melpar model F40015)	22 to 30	
Cathode of CR2	22 to 30	
Center terminal of C11 on blower assembly	22 to 30	

b. Resistance Measurements.

Test point		Resistance (ohms)	Remarks
From	To		
C11 on blower assembly	Ground	10 to 40	Disconnect lead (wire No. W18). Place positive lead on C11, negative lead on ground.
Pin B of P2 on control box	Ground	0	Measure while operating OVER-DRIVE switch.
Pin B of searchlight input power receptacle J2	Ground	600 (±20%)	

3–14. Mount, Searchlight MT–3900A/GSS–14 Continuity Measurements

(fig. 6—15)

Use an ohmmeter or multimeter to check for continuity between the following points. A resistance of more than 0.1 ohm between any of the following points indicates a bad cable and corrective measures should be taken. The resistance between any pins other than those listed should be infinite.

From	To
J4—A	P1—A
J4—B	P1—B
J5—A	P3—A

3–15. Xenon Lamp Troubleshooting

a. Visual Inspection. Any of the following characteristics will indicate a defective xenon lamp. Replace the lamp if any of these symptoms are present.

(1) Check for burned spots on the mating surfaces of all power connection points.

(2) Check to see that the starting wire has not been broken and has not been bent out of shape.

(3) Check to see that the quartz envelope is free from blemishes and the inside of the bulb close to the anode (large electrode) is not darkened to excess.

(4) Check the tungsten electrodes to see that no extremely dark spots are present.

(5) Check to see that electrodes do not have a greenish appearance.

b. Lamp Disposal. Defective xenon lamps will be disposed of as follows:

(1) Pack xenon lamp in its original container, or pack in plastic or paper to prevent scratching the quartz envelope. Use shock-absorbing material with a sturdy shipping box or container.

(2) Forward xenon lamp through normal supply channels for depot maintenance.

3–16. Connections Troubleshooting

If all troubleshooting techniques have been followed and the fault cannot be found, any problems in the searchlight operation are probably not in the searchlight electrical system. Some additional items to check are listed below. If, after making the checks listed below, the problem(s) still exists, refer the searchlight to general support for repair.

a. Remove the xenon lamp (para 3—25). Inspect the bottom ring, bail, and positive pin very carefully. Any evidence of arcing or burning of these surfaces indicates a poor contact on the grounding clamp in the lower elbow or in the high-voltage cable positive insert.

b. Check the positive insert in the high-voltage cable to be screwed in tight.

c. Check all cable connections to be tight.

d. Check with the using unit to see if the searchlight was subjected to any unusual environ-

ments when the malfunction occurred (cold or hot temperatures, unusual vibration or shock, etc). If this is the case, and these conditions cannot be duplicated easily, it is recommended that the searchlight be referred to general support for further maintenance.

e. If possible, check to see that the using unit has terminated the control box power leads properly.

3-17. Limit Switch Adjustments

(fig. 3—2)

a. General. Improper adjustment of the mode limit switches could result in a visible light leak when operating the searchlight in the BO or IR modes. An improper adjustment could also cause a shadow to be cast on the primary reflector, resulting in inefficient operation. This paragraph describes how to adjust the mode limit switches to eliminate such conditions.

b. Tools and Test Equipment Required.

(1) Welders goggles

(2) Face shield

(3) Socket, socket wrench, 3/8-in. drive, 9/16-in. opening

(4) Screwdriver, flat tip, 8 in. long, 3/8-in. tip

(5) Handle, socket wrench, 3/8-in. drive

(6) Extension, socket wrench, 12 in. long, 3/8-in. drive

(7) Socket wrench attachment, socket head screw, 3/8-in. drive, 5/32-in. hex head

(8) Marking pencil or chalk

(9) Tape measure

(10) 11/16" Spanner wrench

c. Test Connections and Conditions. Adjustments may be made with the searchlight mounted on tanks, trucks, or towers. Be sure to observe the safety precautions listed in paragraph 3—5 while performing these adjustments.

d. Procedure.

(1) Set control box SEARCHLIGHT power switch to OFF.

(2) Remove cowling assembly (para 3—23).

(3) Remove lamp cover (para 3—24).

(4) Remove xenon lamp (para 3—25).

(5) Remove primary reflector (para 3—26).

(6) Replace xenon lamp (para 3—25).

(7) Replace lamp cover (para 3—24).

(8) Disable xenon lamp by removing the wire from terminal 5 of converter assembly TB1. Discharge capacitor C12 after wire is disconnected from TB1, terminal 5.

(9) Loosen the three screws that hold the three drive motors to the gear motor support bracket. Disengage the drive motors from the gears.

NOTE

Screws do not have to be removed completely.

(10) Manually rotate the mode layers to the positions they would assume in the VIS FOCUS mode (fig. 2—2).

(11) Place the searchlight in the IR mode by manually rotating IR filter clockwise (looking down).

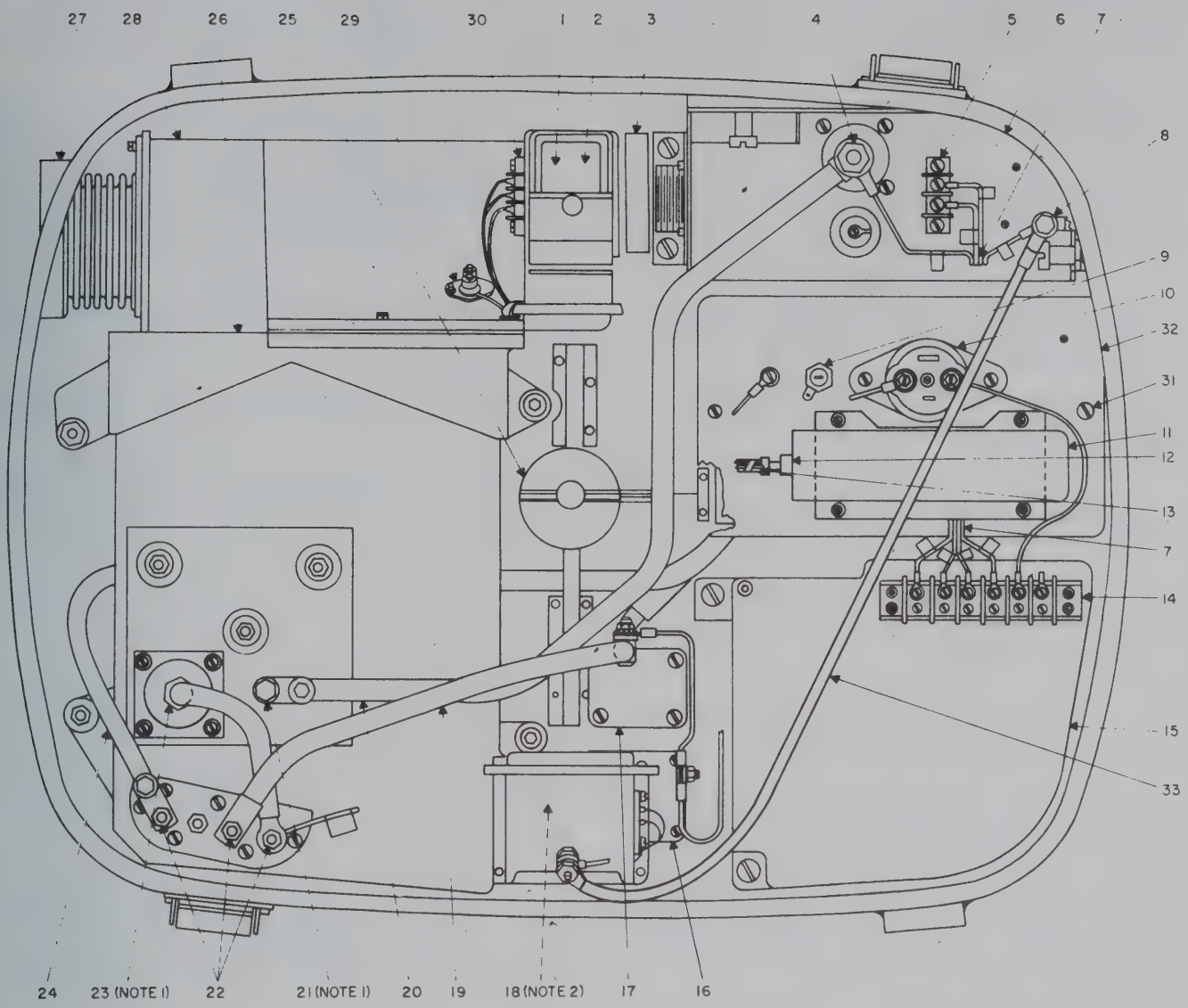
(12) Stop rotating IR filter when the limit switch makes a clicking sound. Mark the position of the IR filter with a marking pencil or a piece of chalk.

(13) Resume rotating IR filter until it meets the mechanical stop.

(14) Measure the distance between the positions noted in (12) and (13) above. The distance between the position where the switch actuated ((12) above) and the mechanical stop ((13) above) should be 1/16 to 1/8 inch. If the distance is correct, proceed to (15) below. If the distance is incorrect, proceed to (*a*) and (*b*) below:

(*a*) If the distance is less than 1/16 inch, turn the adjusting nuts on the appropriate switch to move the switch toward the actuator.

(*b*) If the distance is greater than 1/8 inch,



NOTES

1. 13CR9 USED ON AN/VSS-1 ONLY. ALL OTHER MODELS USE 13CR10
2. LAMP HOUSING ASSEMBLY DRIVE MOTORS AND LIMIT SWITCHES NOT SHOWN.

EL6230-219-35-55

1 Thermoswitch 13A3S8
2 High-voltage cable 8
3 Cover assembly 13A8A1
4 Capacitor 14A1C12
5 Terminal board 14A1TB1
6 Igniter assembly 14
7 Igniter-to-converter wiring harness 12
8 Ground 14A1E1
9 Diode 15CR2
10 Circuit breaker 15CB1
11 Relay panel assembly 15
12 Connector 17A4P3
13 Wiring harness, branched 17A4
14 Terminal board 16A1A3TB1
15 Converter assembly 16
16 Converter relay 17K14
17 Overdrive relay 17K2
18 Thermoswitch 13A3S7
19 Cable 17A2
20 Cable 17A1
21 Cathode Diode CR9 or CR10
22 Ballast resistor 13A1A1R19
23 Anode Diode CR9 or CR10
24 Cable 17A3
25 Adjustable reflector assembly 10
26 Heat exchanger assembly 13
27 Blower inlet screen 11MP6
28 Blower assembly 13
29 Capacitor 13C11
30 Terminal board 13A5/B2
31 Screws
32 Cover assembly 15A2
33 Electrical lead

Figure 3—1. Searchlight subassembly, parts location.

turn the adjusting nuts to back the switch away from the actuator.

(15) Rotate IR filter 180 degrees and repeat (14) above (B, fig. 3—2).

(16) Reengage the drive motor gears to the drive motors and tighten screws.

CAUTION

Be sure that the wire disconnected from TB1 in (8) above is not shorted to the searchlight housing.

(17) Set control box SEARCHLIGHT power switch to STANDBY.

(18) Set control box mode SELECTOR SWITCH to IR WIDE.

(19) Use the edges of IR filter as a guide. Determine whether the blackout shield is properly positioned (C, fig. 3—2).

(*a*) If blackout shield is positioned as shown in C, figure 3—2, proceed to (20) below.

(*b*) If blackout shield is positioned as shown in D, figure 3—2, set control box SEARCHLIGHT power switch to ON. Adjust the appropriate limit switch by turning the adjusting nuts, to move the switch away from the actuator. Check the adjustment by setting control box SEARCHLIGHT power switch to STANDBY.

(*c*) If blackout shield is positioned as in E, figure 3—2, set control box SEARCHLIGHT power switch to ON. Turn adjusting nuts, to move the switch toward the actuator. Check adjustment by setting control box SEARCHLIGHT power switch to STANDBY.

(20) Use the edges of IR filter as a guide. Determine whether the refractor lens is positioned as shown in C, figure 3—2.

(*a*) If the refractor lens is positioned as in C, figure 3—2, proceed to (21) below.

(*b*) If the refractor lens is positioned as in D, figure 3—2, set control box mode SELECTOR SWITCH to IR. Adjust the appropriate limit switch by turning the adjusting nuts, to move the switch toward the actuator. Check adjustment by setting control box mode SELECTOR SWITCH to IR WIDE.

(*c*) If refractor lens is positioned as in E, figure 3—2, set control box mode SELECTOR SWITCH to IR FOCUS. Turn the adjusting nuts to move the switch away from the actuator. Check adjustment by setting control box mode SELECTOR SWITCH to IR WIDE.

(21) Set control box SEARCHLIGHT power switch to ON.

(22) Set control box mode SELECTOR SWITCH to VIS FOCUS.

(23) Use the edges of the IR filter as a guide. Determine whether the blackout shield is properly positioned.

(*a*) if the blackout shield is positioned as in F, figure 3—2, proceed to (24) below.

(*b*) If the blackout shield is positioned as in G, figure 3—2, set control box SEARCHLIGHT power switch to STANDBY. Adjust the appropriate switch by turning the adjusting nuts, to move the switch away from the actuator. Check adjustment.

(*c*) If the blackout shield is positioned as in H, figure 3—2, set control box SEARCHLIGHT power switch to STANDBY. Turn the adjusting nuts, to move the switch toward the actuator. Check adjustment.

(24) Set control box SEARCHLIGHT power switch to ON.

(25) Set control box mode SELECTOR SWITCH to VIS FOCUS.

(26) Use the edges of the IR filter as a guide. Determine whether the refractor lens is properly positioned.

(*a*) If the refractor lens is positioned as in F, figure 3—2, proceed to (27) below.

(*b*) If the refractor lens is positioned as in G, figure 3—2, set control box mode SELECTOR SWITCH to VIS WIDE. Adjust the appropriate switch by turning the adjusting nuts to move the switch toward the actuator. Check adjustment.

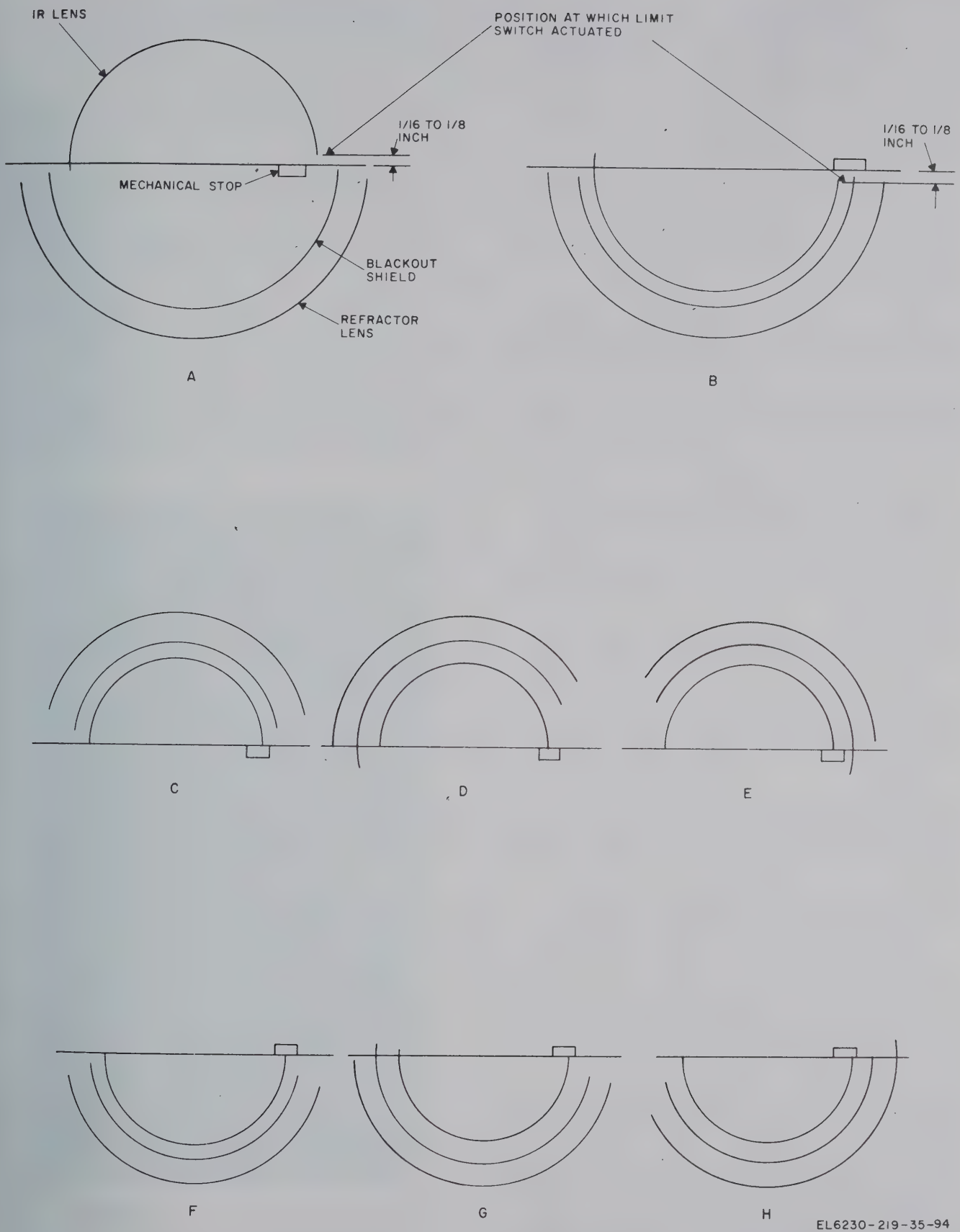


Figure 3—2. Limit switch adjustments.

(c) If the refractor lens is positioned as in H, figure 3—2, set control box mode SELECTOR SWITCH to VIS WIDE. Turn the adjusting nuts, to move the switch away from the actuator.

(27) Set control box SEARCHLIGHT power switch to OFF.

(28) Reconnect the wire to terminal 5 on TB1.

(29) Set control box SEARCHLIGHT power switch to ON.

(30) Set control box mode SELECTOR SWITCH to IR FOCUS, IR WIDE, BO, VIS WIDE, and VIS FOCUS in turn. Check for visible light leaks and shadows. If conditions are normal, proceed to (31) below. If conditions are abnormal, repeat the adjustments described above.

CAUTION

Be sure to wear welders goggles when observing searchlight operation.

(31) Set control box SEARCHLIGHT power switch to OFF.

(32) Remove lamp cover (para 3—24).

(33) Remove xenon lamp (para 3—25).

CAUTION

Be sure lamp has cooled off before removing.

(34) Replace the primary reflector (para 3—26).

(35) Replace xenon lamp (para 3—25).

(36) Replace lamp cover (para 3—24).

(37) Replace cowling assembly (para 3—23).

3—18. Cowling Latch Adjustments
(fig. 3—3)

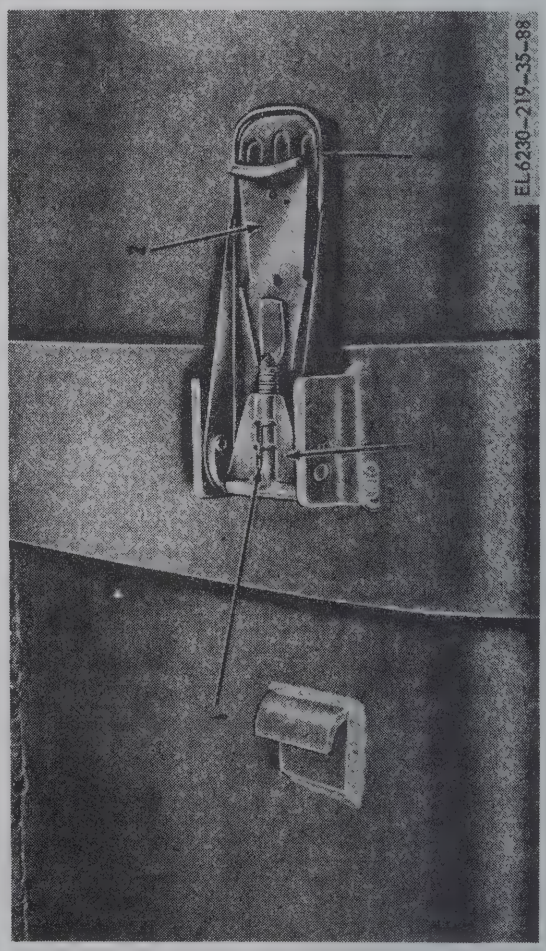
Four cowling latches are provided to secure the cowling to the searchlight housing. These latches are adjustable to provide a means of adjusting tension on the cowling gasket to insure a waterproof seal between the cowling and the searchlight housing. The latches on all models are the same; however, the latches on the AN/VSS—1 are welded onto the cowling itself and the latches on other models are welded to the searchlight. Proceed as follows to adjust cowling latches.

a. Unfasten latch and remove cotter pin (1) from end of latch arm (2).

b. Turn latch arm (2) in or out of support (3) until an 8- to 12-pound pull is required at extreme end of latch lever (4) to release latch when latch is closed. Use a spring-balance tension scale of 20 pounds maximum capacity to measure tension.

c. Install cotter pin (1) in end of latch arm (2) so head of cotter pin (1) is up when latch is closed.

d. Bend ends of cotter pin (1) into slot in support (3). If necessary, cut off ends of cotter pin (1) to prevent them from extending beyond edge of support (3).



1 Cotter pin
2 Latch arm
3 Support
4 Latch lever

Figure 3—3. Cowling latch adjustments.

Section IV. DIRECT SUPPORT REPAIR, REMOVAL AND REPLACEMENT

3-19. General

This section describes the repair, removal, and replacement of assemblies and components. Direct support maintenance personnel are authorized to perform these procedures. Read the procedure thoroughly before removing an assembly or component.

3-20. Replacement and Repair Techniques

a. Replacement Techniques. When replacing parts in the searchlight, observe the following precautions and techniques:

(1) Before a part is unsoldered, observe the position of every lead, and identify each lead that is to be removed with reference to its soldered terminal. Tag each lead or draw a small sketch of the wiring to the component; note the color coding and lead destination.

(2) Where damaged parts must be replaced, use identical replacement parts. The new part must be placed in the same mounting position as the one it replaces.

(3) Before soldering, carefully clean the terminals and lead connections. Use sufficient heat to make a well-soldered connection. A poorly soldered connection that causes faulty operation is difficult to trace.

NOTE

Direct support personnel are not authorized to repair printed circuit boards. Defective printed circuit boards will be referred to general support for repair.

b. Repair Techniques. When mechanical parts are removed or disassembled, perform the following:

WARNING

Prolonged breathing of cleaning compound is dangerous; provide adequate ventilation. Cleaning compound is flammable; do not use near open flame.

(1) Clean all parts with cleaning compound; use a soft brush if necessary.

(2) Remove surface corrosion from steel parts by polishing lightly with fine crocus cloth.

(3) Dry parts with compressed air if available.

(4) When not in use, keep all usable parts in clean covered plastic containers or plastic bags.

(5) Inspect all parts for cracks, pits, nicks, and scratches.

(6) If parts are impractical to repair, replace with new or serviceable ones.

3-21. Relay Panel Interchange

Relay panel assembly Varo model 9913 is supplied only with the AN/VSS—1.

Melpar model F40015 is supplied only with the AN/VSS—1C (serial No. 3004—4239). When it becomes unrepairable, Varo model 9922 will replace it; however, the wiring connections to the AN/VSS—1C drive motor limit switches must be correctly changed to enable the searchlight to operate properly. Refer to figure 3—16 and make the following wire changes before the relay panel assembly is replaced:

a. The wire now connected to the NC contacts of 5S1 must be connected to the NC contacts of 5S2.

b. The wire now connected to the NC contacts of 5S2 must be connected to the NC contacts of 5S1.

c. The wire now connected to the NC contacts of 5S3 must be connected to the NC contacts of 5S4.

d. The wire now connected to the NC contacts of 5S4 must be connected to the NC contacts of 5S3.

e. The wire now connected to the NC contacts of 5S5 must be connected to the NC contacts of 5S6.

f. The wire now connected to the NC contacts of 5S6 must be connected to the NC contacts of 5S5.

3-22. Cable Check and Repair

a. Continuity. When measuring continuity, the ohmmeter leads sometimes are not long enough to

be connected to the end of the cable. The following procedure is given as a convenient method of determining the condition of a cable.

(1) Place a resistor of known value (50,000 ohms or more) from one end of the cable to ground.

(2) Connect the ohmmeter leads between the cable and ground at the other end of the cable.

(3) If the meter indicates approximately 50,000 ohms, the cable has continuity.

(4) If the meter indicates infinite resistance, the cable is open.

(5) If the meter indicates zero resistance, the cable is shorted to ground.

(6) If the meter indicates much less than 50,000 ohms, but not necessarily zero, the cable has a dc leakage path to ground.

b. Repair. A damaged cable connector cannot be repaired; it must be replaced. Splicing broken cables is accomplished by placing a male connector on one end of the break and a female connector on the other end. The cables are then joined by mating the two connectors.

3-23. Cowling Assembly

(fig. 3—4)

a. Removal.

(1) Unfasten four cowling latches (6) that secure cowling assembly (2) to searchlight housing assembly (4).

(2) Pull cowling assembly (2) forward to clear drive motors (9) and lamp housing assembly (10).

NOTE

Mark cowling assembly (2) so that when it is replaced it will be in its original position relative to searchlight housing assembly (4).

b. Replacement.

(1) Place cowling assembly (2) in its original position relative to searchlight housing assembly (4).

(2) Push cowling assembly (2) toward the rear of searchlight housing assembly (4). Be sure to clear drive motors (9) and lamp housing assembly (10).

(3) Fasten four cowling latches (6).

3-24. Lamp Cover

(fig. 3—5)

a. Removal.

(1) Remove cowling assembly (para 3—23).

(2) Refer to figure 3—5 and remove screws (5) and washers (6) that secure lamp cover (2) to bracket (3).

(3) Remove the lamp cover (2).

b. Replacement.

(1) Align lamp cover (2) into its original position.

(2) Replace screws (5) and washers (6) and secure lamp cover (2) to bracket (3).

(3) Replace cowling assembly (para 3—23).

3-25. Xenon Lamp

(fig. 3—5 and 3—6)

a. Removal.

(1) Remove cowling assembly (para 3—23).

(2) Remove lamp cover (para 3—24).

(3) Remove (fig. 3—5) screws (7) that secure elbow cover (1) to upper elbow (4) and snap off elbow cover (1).

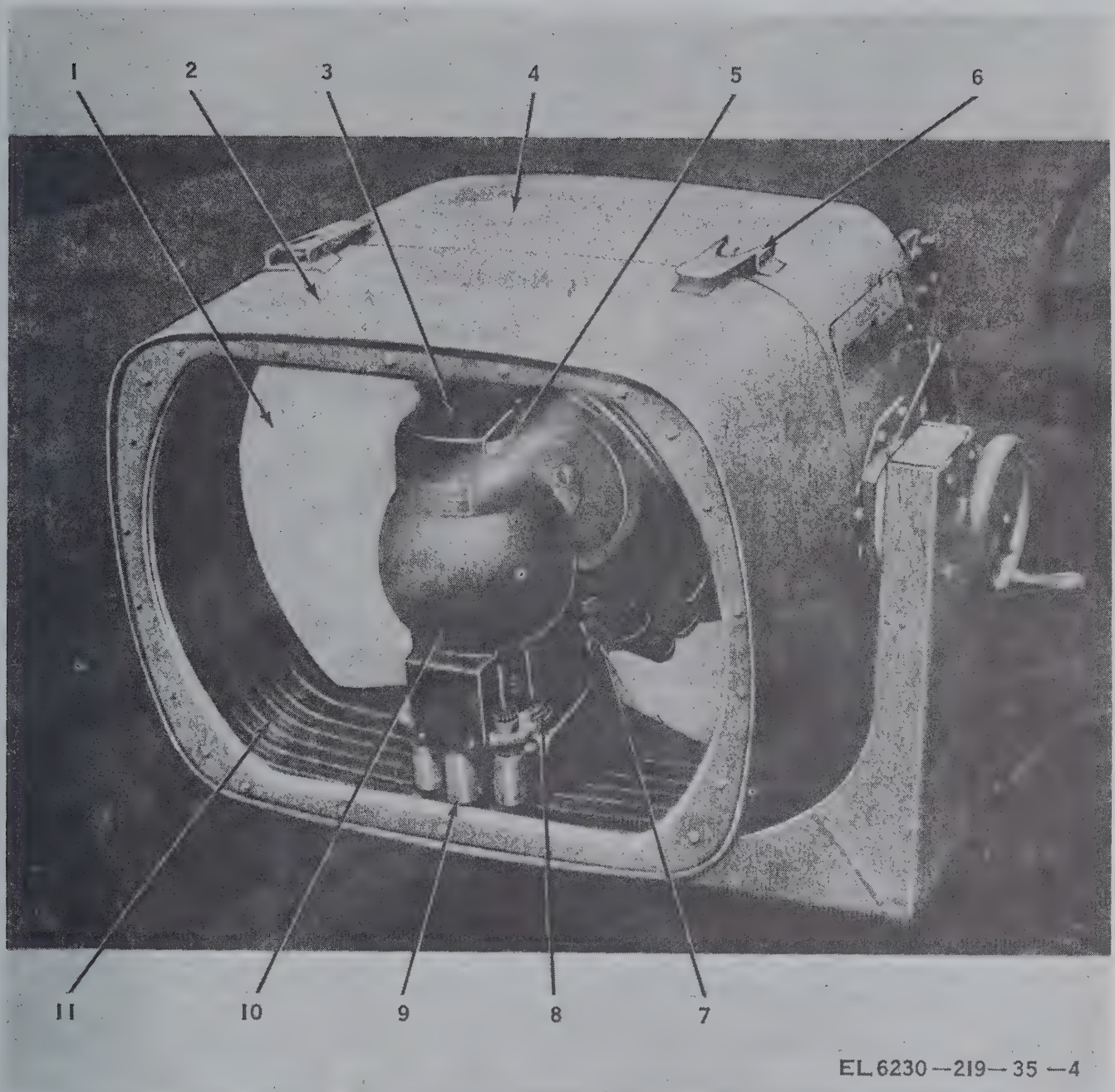
NOTE

Wiring in elbow cover (1) does not allow for complete removal.

(4) Place elbow cover (1) on top of searchlight housing assembly (8).

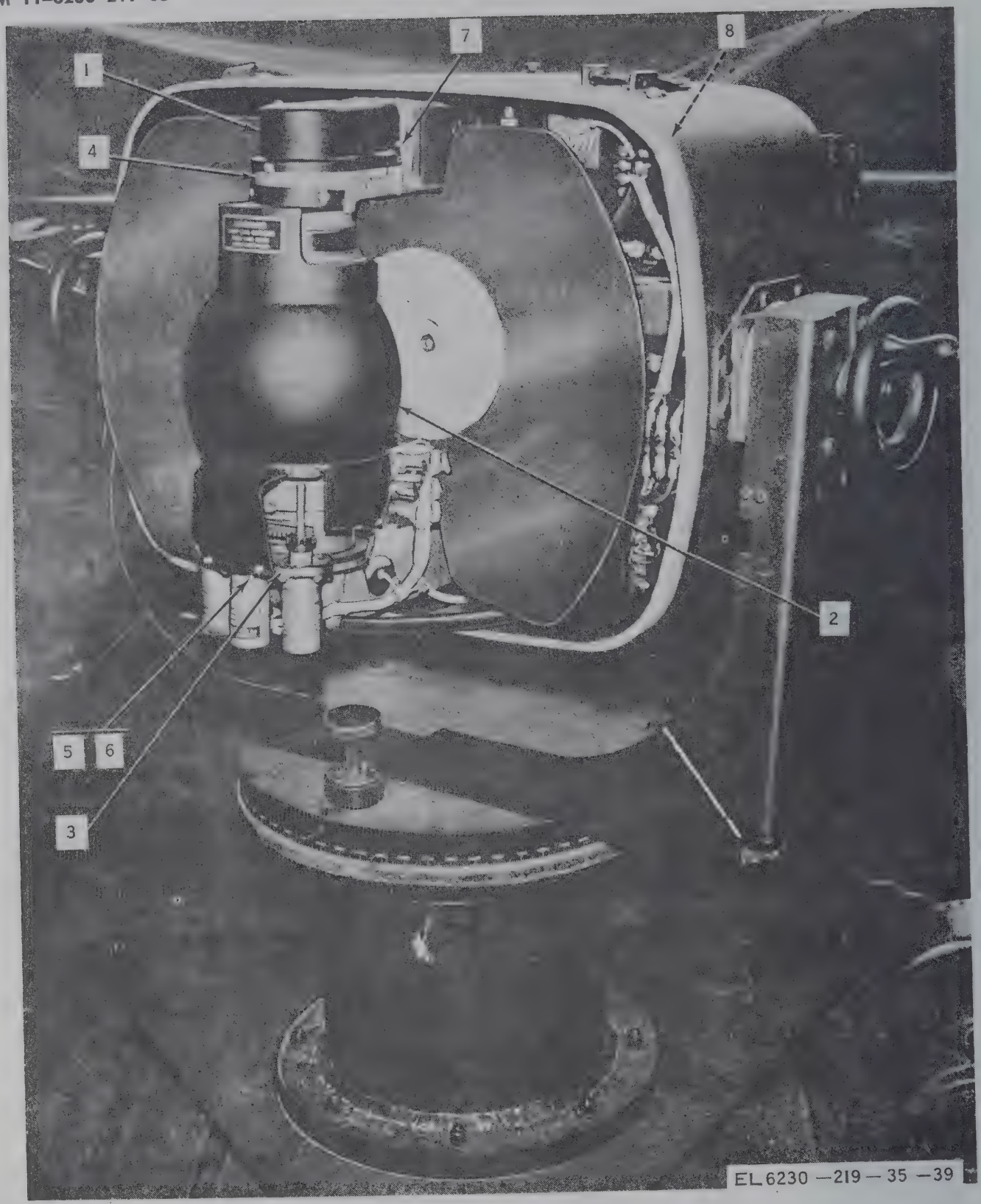
WARNING

The xenon lamp can explode and cause serious injury. Wear a face mask when removing xenon lamp.



1 Primary reflector 9MP3
2 Cowling assembly 3A1
3 Upper elbow 13A5
4 Searchlight housing assembly 17
5 Lamp housing assembly 6A1
6 Cowling latch 3A1MP1
7 Limit switches 5S1 through 5S6
8 Lower elbow 13MP7
9 Drive motors 4A1 B1
10 Lamp cover MP11
11 Cowling glass 3

Figure 3—4. Searchlight, Subassembly MX—7883/GSS—14.



1 Elbow cover 13A7
2 Lamp cover MP11
3 Bracket 4A1A1
4 Upper elbow 13A5
5 Screws 4A1H1
6 Washers 4A1H2
7 Screws
8 Searchlight housing assembly 17

Figure 3—5. Lamp cover removal.

(5) Slip (fig. 3—6) lamp bail (1) off of high-voltage cable (6) and move the cable to one side.

(6) Grasp lamp bail (1) and loosen xenon lamp (8) from its pressure-fitted bottom connector. Do not remove xenon lamp (8).

(7) Place cardboard lamp container (7) (received with spare xenon lamps (8)) over upper elbow (5).

(8) Reach into the top of lamp container (7), grasp lamp bail (1), and slide xenon lamp (8) out of lamp housing assembly (9) and into container (7).

(9) Store xenon lamp (8) within lamp container (7) in a safe place.

NOTE

Refer to paragraph 3—15 for disposal procedures for defective xenon lamps.

b. Replacement.

WARNING

The xenon lamp can explode and cause serious injury. Wear a face mask when replacing the xenon lamp.

(1) Reach (fig. 3—6) into the top of lamp container (7) (received with spare xenon lamps (8)) and grasp the lamp bail (1). Slide xenon lamp (8) out of lamp container (7).

(2) Place xenon lamp (8) into its pressure-fitted bottom connector. Remove cardboard lamp container (7).

(3) Slip the lamp bail (1) onto the high-voltage cable (6).

(4) Place (fig. 3—5) the elbow cover (1) on the upper elbow (4) and secure with screws (7).

(5) Place lamp cover (para 3—24).

(6) Replace cowling assembly (para 3—23).

3-26. Primary Reflector

(fig. 3—6 and 3—7)

a. Removal.

(1) Remove cowling assembly (para 3—23).

(2) Remove lamp cover (para 3—24).

(3) Remove xenon lamp (para 3—25).

(4) Expand (fig. 3—6) C-ring (4) on upper elbow (5) with retaining pliers and slide it against the shoulder of upper elbow (5).

(5) Slide the slip ring (3) up against the C-ring (4).

(6) Unfasten (fig. 3—7) latch (6) that secures upper elbow (4) to the blower assembly. Lift upper elbow (4) from lamp housing assembly (2).

NOTE

Wiring in upper elbow (4) does not allow for its complete removal.

(7) Place upper elbow (4) on the top of the searchlight housing assembly.

(8) Remove screw (7) (located at the center of the primary reflector (3) which secures primary reflector (3) to reflector adjustment assembly (8).

(9) Grasp primary reflector (3) at the outer edges (with palm of hand on rear surface of primary reflector (3) and remove it from the searchlight housing assembly. Cover the reflector surface to prevent damage.

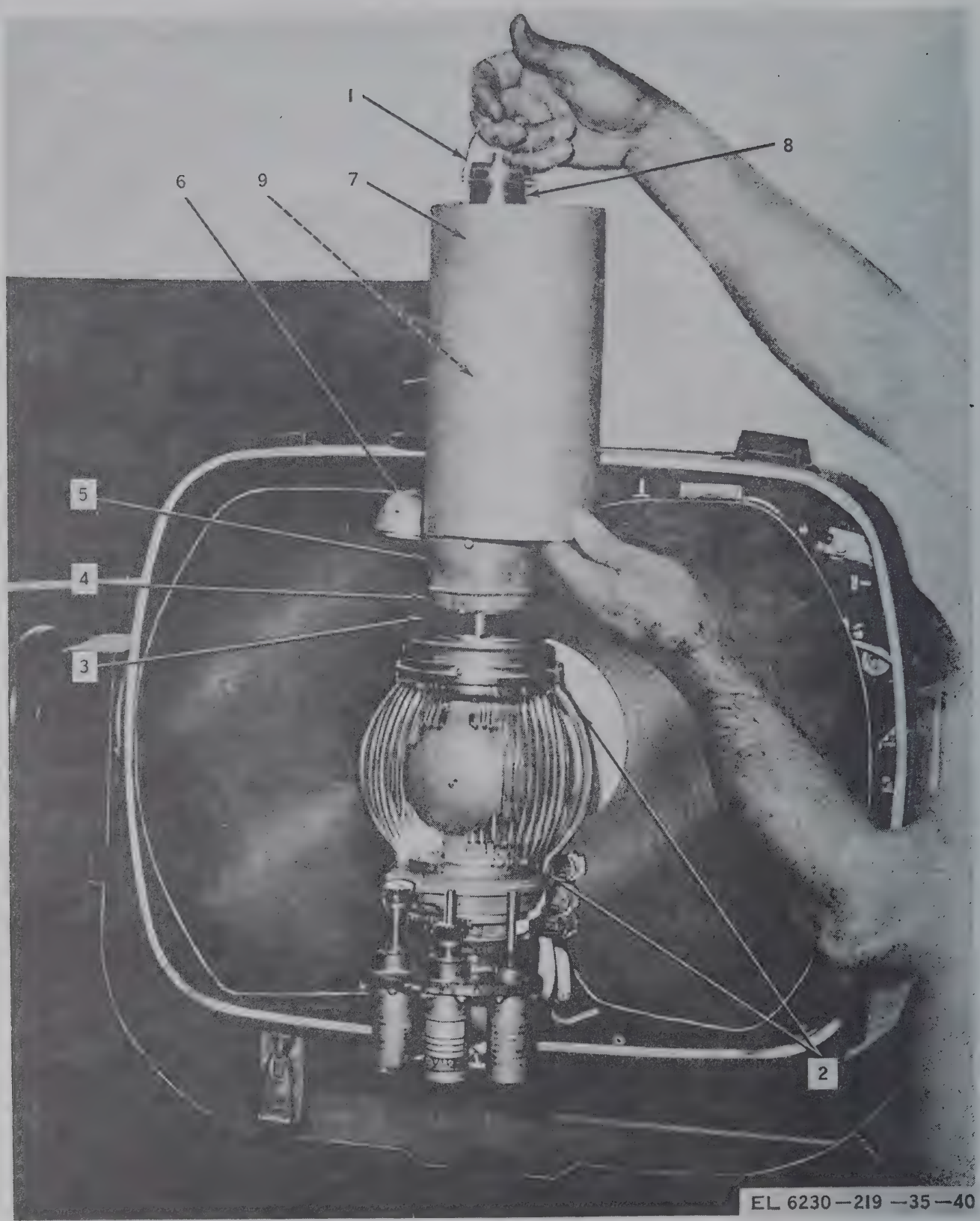
b. Replacement.

(1) Grasp (fig. 3—7) primary reflector (3) at the outer edges (with palm of hand on rear surface of the primary reflector (3) and place it in its original position in the searchlight housing assembly.

(2) Replace screw (7) in the screw hole located at the center of primary reflector (3). Secure primary reflector (3) to reflector adjustment assembly (8).

(3) Remove upper elbow (4) from the top of the searchlight housing assembly. Place (fig. 3—6) upper elbow (5) on lamp housing assembly (2) and secure it to the blower assembly with latch (9).

(4) Slide slip ring (3) up against upper elbow (5).



1 Lamp bail
2 Lamp housing assembly 6A1
3 Slip ring MP13
4 C-ring MP12
5 Upper elbow 13A5
6 High-voltage cable 8
7 Lamp container 7A1
8 Xenon lamp 7DS1
9 Latch

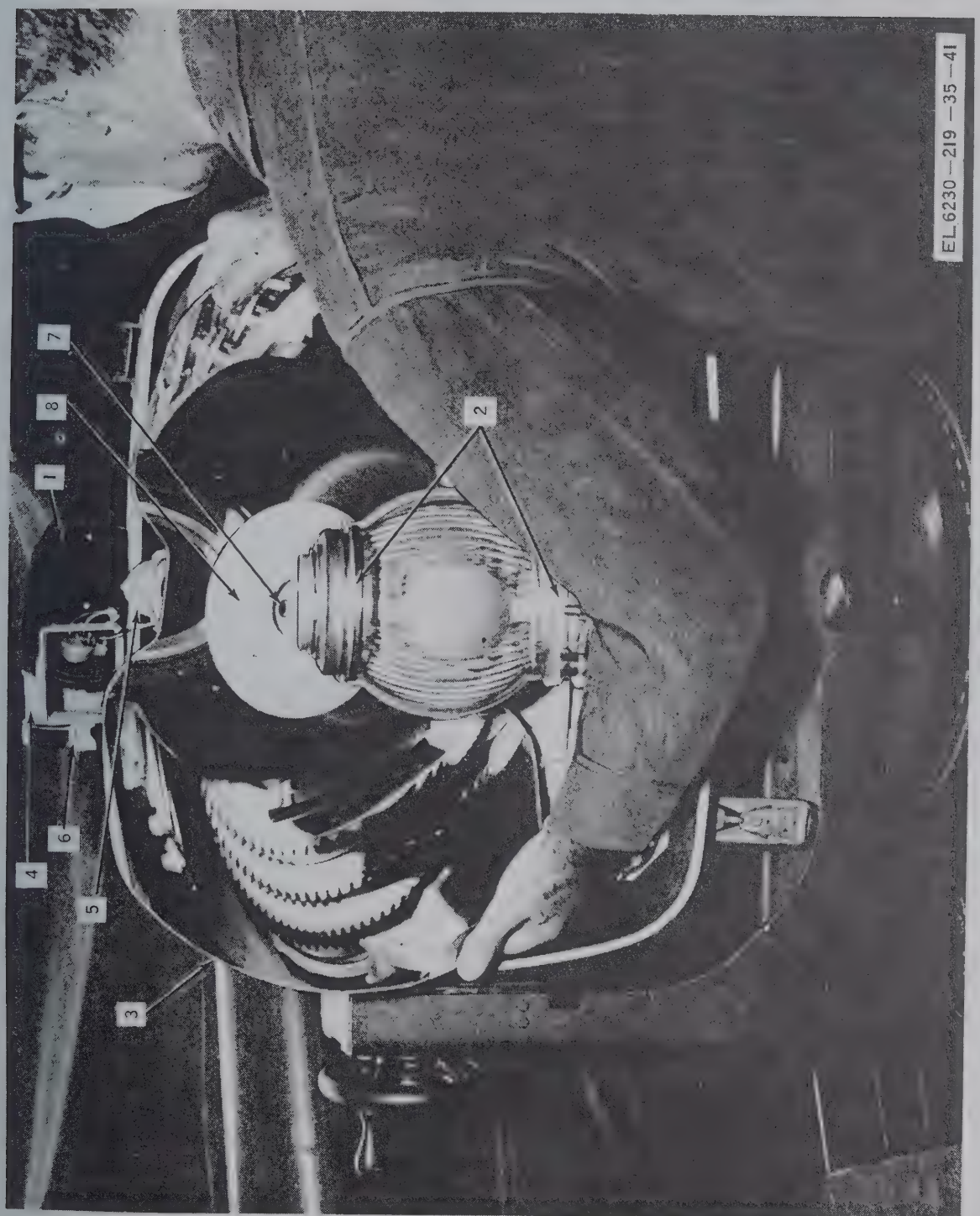
Figure 3—6. Xenon lamp removal.

(5) Expand **C**-ring (4) with retaining ring pliers and slide **C**-ring (4) up against slip ring (3). Release the tension on **C**-ring (4).

(6) Replace the xenon lamp (para 3—25).

(7) Replace the lamp cover (para 3—24).

(8) Replace the cowling assembly (para 3—23).



1 Elbow cover 13A7
2 Lamp housing assembly 6A1
3 Primary reflector 9MP3
4 Upper elbow 13A5
5 High-voltage cable 8
6 Latch
7 Screw 9H16
8 Reflector adjustment assembly 10

Figure 3—7. Primary reflector removal.

3-27. Lamp Housing Assembly
(fig. 3—6 and 3—8)

a. Removal.

(1) Remove the cowling assembly (para 3—23).

(2) Remove the lamp cover (para 3—24).

(3) Remove the xenon lamp (para 3—25).

(4) Refer to figure 3—6. Expand **C**-ring (4) on upper elbow (5) with retaining ring pliers and slide **C**-ring (4) against the shoulder of upper elbow (5).

(5) Slide slip ring (3) up against the **C**-ring (4).

(6) Unfasten latch (10) that secures the upper elbow (5) to the blower assembly and lift upper elbow (5) from lamp housing assembly (2).

NOTE
Wiring in the upper elbow (5) does not allow for its complete removal.

(7) Place (fig. 3—8) upper elbow on the top of the searchlight housing assembly.

(8) Remove screws (18) that secure lamp housing assembly (3) to lower elbow (4) and remove the lamp housing assembly (3) from the searchlight housing assembly.

b. Replacement.

(1) Align (fig. 3—8) lamp housing assembly with lower elbow (4) and replace the screws removed in *a*(8) above.

(2) Remove the upper elbow from the top of the searchlight housing assembly.

(3) Place (fig. 3—6) upper elbow (5) on lamp housing assembly and fasten latch (9).

(4) Slide slip ring (3) up against the upper elbow (5).

(5) Expand the **C**-ring (4) with retaining ring pliers and slide **C**-ring (4) up against slip ring (3). Release the tension on the retaining ring pliers.

(6) Replace the xenon lamp (para 3—25).

(7) Replace lamp cover (para 3—24).

(8) Replace the cowling assembly (para 3—23).

3-28. Heat Exchanger and Blower Assemblies
(fig. 3—8)

a. Removal.

(1) Remove the cowling assembly (para 3—23).

(2) Remove the lamp cover (para 3—24).

(3) Remove the xenon lamp (para 3—25).

(4) Remove the primary reflector (para 3—26).

(5) Remove the lamp housing (para 3—27).

(6) Remove slide cover (1) from blower assembly (13).

(7) Disconnect the high-voltage cable from the igniter assembly (para 3—41).

(8) Replace the upper elbow and cover on the blower assembly cover.

(9) Tag and disconnect cables attached to the heat exchanger assembly (12).

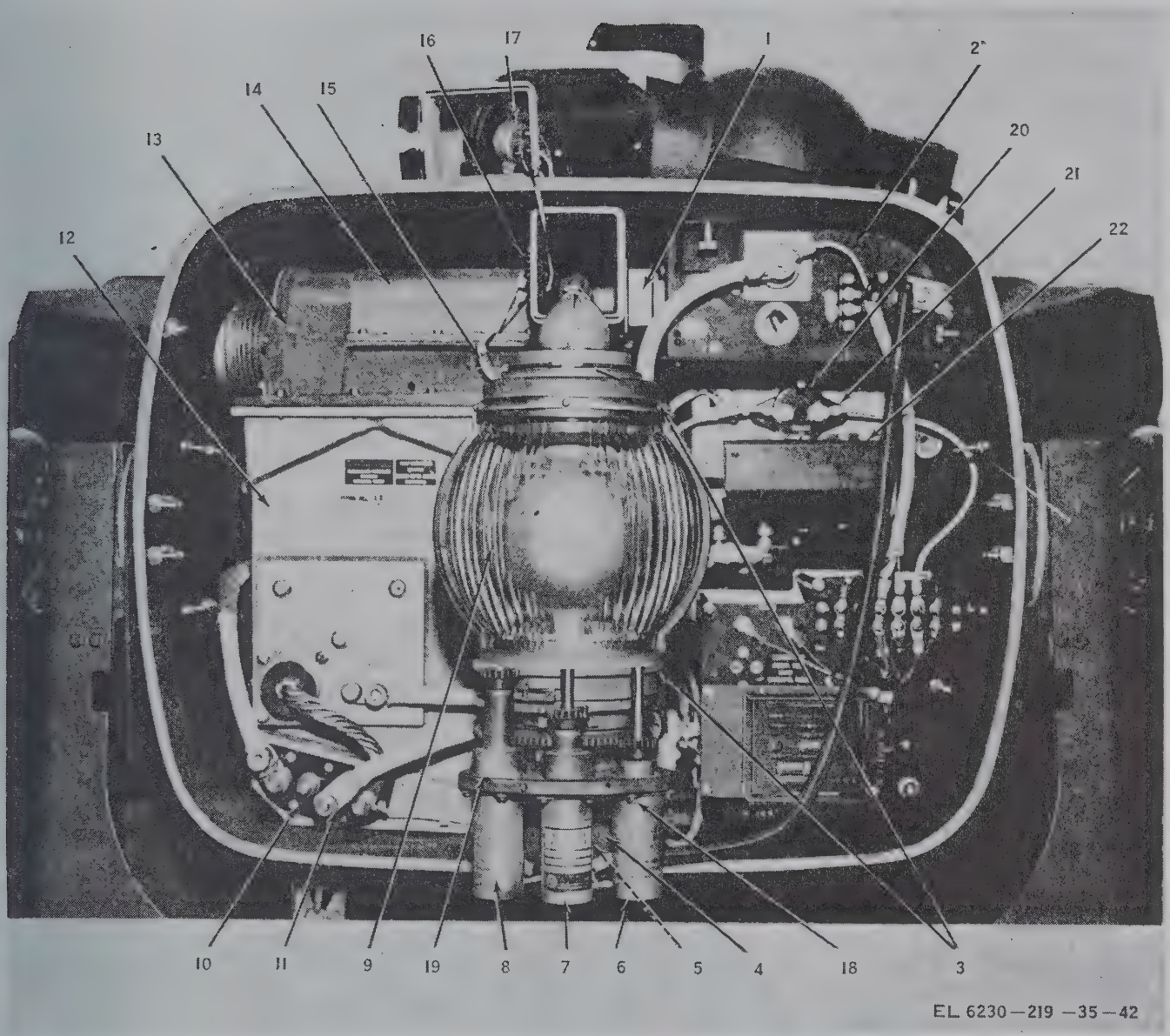
(10) Tag and disconnect the red wire from the motor capacitor (15) and the black wire from the terminal board (16) on the blower assembly cover (14).

(11) Remove the screws that secure the blower inlet screen to the searchlight housing assembly and blower assembly (para 3—46).

(12) Tilt the searchlight housing assembly to expose the bottom and remove the screws that secure the blower outlet screen to the searchlight housing assembly and heat the exchanger assembly (para 3—46).

(13) Remove the screws (18) that secure the heat exchanger assembly (12) to the housing and remove the heat exchanger assembly and the blower assembly (13).

b. Replacement.



1 Slide cover 13A8A1
2 Igniter assy 14
3 Lamp housing assy 6A1
4 Lower elbow 13MP7
5 Thermal switch 13A3S7
6 Motor 4A1B3
7 Motor 4A1B2
8 Motor 4A1B1
9 Lamp housing 6MP2
10 Ballast resistor 13A1R19
11 Cable 17A1
12 Heat exchanger assy 13
13 Blower assy 13
14 Blower assy cover 13A8
15 Capacitor 13C11
16 Terminal board 13A5TB2
17 Thermal switch 13A3S8
18 Screws
19 Bracket
20 Circuit breaker 15CB1
21 Screw 15CB1A1
22 Cover assembly 15A2

Figure 3—8. Lamp housing assembly removal.

(1) Tilt the searchlight housing assembly to expose the bottom.

(2) Position heat exchanger and blower assembly (13) on the searchlight housing assembly.

(3) Replace screws (18) that secure the heat exchanger to the searchlight housing assembly.

(4) Replace the screws that secure the blower outlet screen to the searchlight housing assembly and the heat exchanger assembly (para 3—46).

(5) Tilt the searchlight housing assembly to its normal position.

(6) Replace the screws that secure the blower inlet screen to the searchlight housing assembly and the blower assembly (para 3—46).

(7) Reconnect the wires to motor capacitor (15) and terminal board (16) on blower assembly cover (14) as coded in removal (*a*(10) above).

(8) Reconnect the cables to heat exchanger assembly (12) as coded in removal (*a*(9) above).

(9) Replace the upper elbow and the cover to the blower assembly cover.

(10) Replace the high-voltage cable to the igniter assembly (para 3—41).

(11) Replace the slide to blower assembly cover (14).

(12) Replace the lamp housing (para 3—27).

(13) Replace the primary reflector (para 3—26).

(14) Replace the xenon lamp (para 3—25).

(15) Replace the lamp cover (para 3—24).

(16) Replace the cowling assembly (para 3—23).

3–29. Converter Assembly
(fig. 3—9)

a. Removal.

(1) Remove the cowling assembly (para 3—23).

(2) Remove the lamp cover (para 3—24).

(3) Remove the xenon lamp (para 3—25).

(4) Remove the primary reflector (para 3—26).

(5) Tag and disconnect wires attached to converter assembly (3).

(6) Unscrew captive screws (6) that secure converter assembly (3) to searchlight housing assembly (2).

(7) Carefully slide the converter assembly past limit switches (4) and out of searchlight housing (2).

b. Replacement.

(1) Position converter assembly (3) as shown in figure 3—8.

(2) Carefully slide converter assembly (3) past limit switches (4) into searchlight housing (2).

(3) Replace and tighten captive screws (6) that secure converter assembly (3) to searchlight housing assembly (2).

(4) Reconnect the wires to converter assembly (3) as coded in removal (*a*(5) above).

(5) Replace the primary reflector (para 3—26).

(6) Replace the xenon lamp (para 3—25).

(7) Replace the lamp cover (para 3—24).

(8) Replace the cowling assembly (para 3—23).

3–30. Igniter Assembly
(fig. 3—10)

a. Removal.

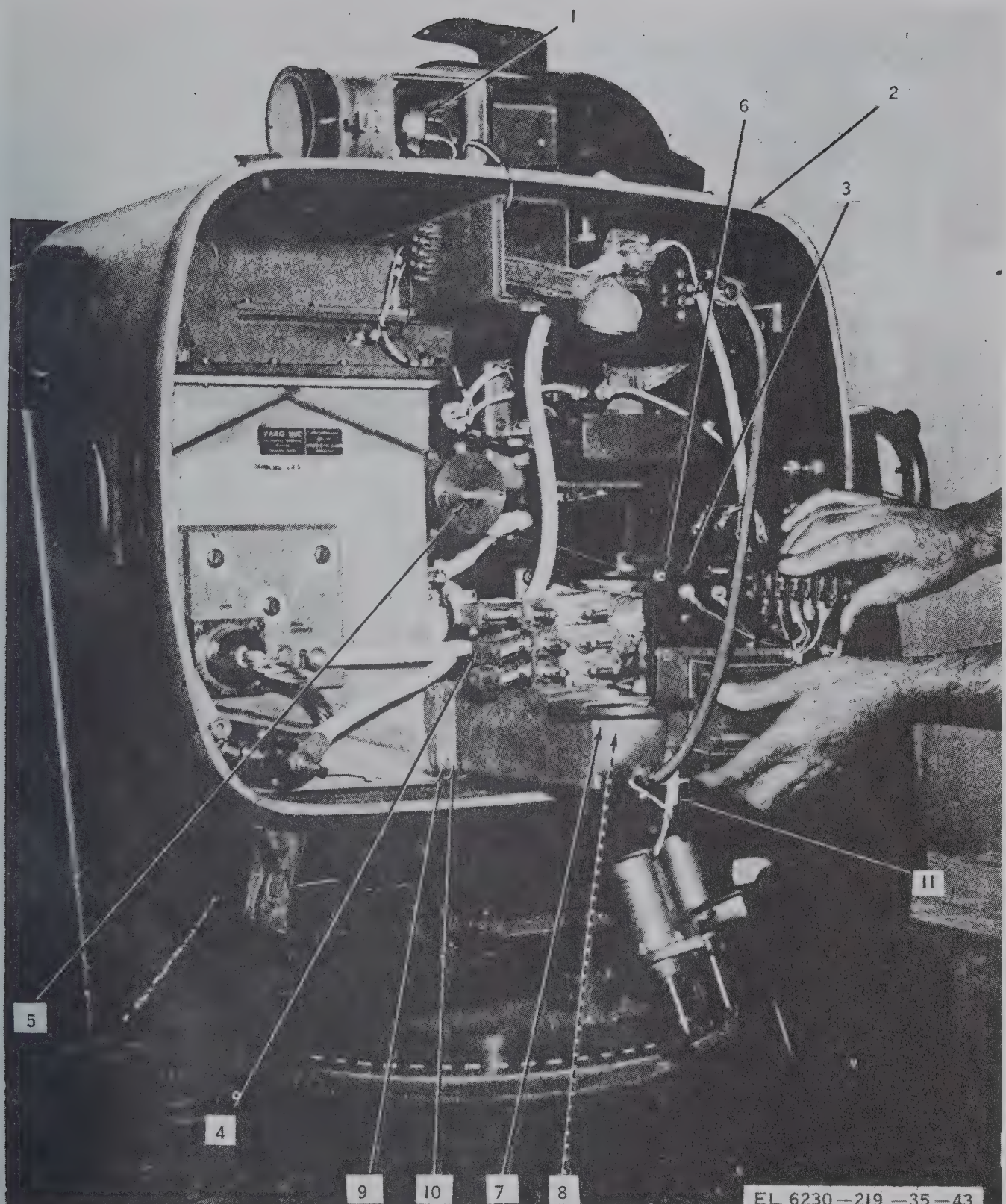
(1) Remove the cowling assembly (para 3—23).

(2) Remove the lamp cover (para 3—24).

(3) Remove the xenon lamp (para 3—25).

(4) Remove the primary reflector (para 3—26).

(5) Remove (fig. 3—10) slide cover (2) from the blower assembly.



1 Thermal switch 13A3S8
2 Searchlight housing 17
3 Converter assy 16
4 Limit switches 5S1—555
5 Reflector adjustment assy 10
6 Captive screws
7 Lower elbow 13MP7
8 Thermal switch 13A3S7
9 Screws 13H15
10 Washers 13MP7H9
11 Motor drive and switch harness 4

Figure 3—9. Converter assembly removal.

(6) Disconnect high-voltage cable (1) from igniter assembly (3).

(7) Tag and disconnect cables and wires attached to igniter assembly. Remove captive screws (11) that secure igniter assembly (3) to searchlight housing assembly (10) and carefully slide igniter assembly (3) out of searchlight housing assembly (10).

b. Replacement.

(1) Carefully slide igniter assembly (3) into searchlight housing assembly (10).

(2) Tighten captive screws (11) that secure igniter assembly (3) to searchlight housing assembly (10).

(3) Connect the cables and wires to igniter assembly (3) as coded in removal (*a*(7) above).

(4) Connect high-voltage cable (1) to igniter assembly (3).

(5) Replace slide cover (2) on the blower assembly.

(6) Replace the primary reflector (para 3—26).

(7) Replace the xenon lamp (para 3—25).

(8) Replace the lamp cover (para 3—24).

(9) Replace the cowling assembly (para 3—23).

3–31. Relay Panel Assembly (Varo Model 9922 and Melpar Model F40015)

(fig. 3—11)

a. Removal.

(1) Remove the cowling assembly (para 3—23).

(2) Remove the lamp cover (para 3—24).

(3) Remove the xenon lamp (para 3—25).

(4) Remove the primary reflector (para 3—26).

(5) Disconnect plug (6) from relay panel (3).

(6) Remove screws (7) that secure relay panel (3) to relay panel cover (2) and remove relay panel (3).

b. Replacement.

(1) Position relay panel (3) on relay panel cover (2).

(2) Secure relay panel (3) to relay panel cover (2) with screws (7).

(3) Connect plug (6) to relay panel (3).

(4) Replace the primary reflector (para 3—26).

(5) Replace the xenon lamp (para 3—25).

(6) Replace the lamp cover (para 3—24).

(7) Replace the cowling assembly (para 3—23).

3–32. Relay Panel Assembly (Varo Model 9913)

(fig. 3—12)

a. Removal.

(1) Remove the cowling assembly (para 3—23).

(2) Remove the lamp cover (para 3—24).

(3) Remove the xenon lamp (para 3—25).

(4) Remove the primary reflector (para 3—26).

(5) Tag and disconnect cables from J6 (1) and J4 (2).

(6) Tag and disconnect wires from CB1 (3).

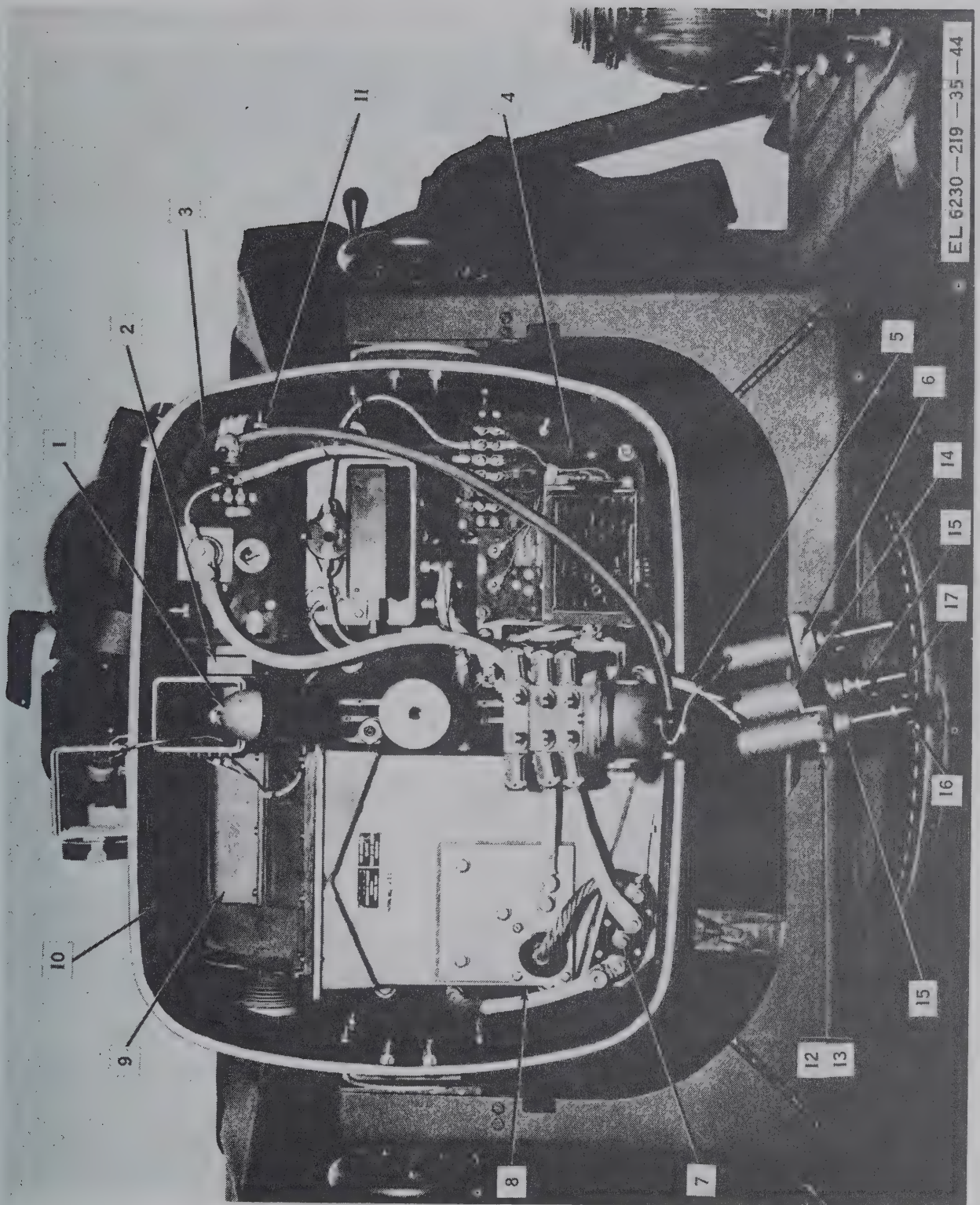
(7) Remove four screws (4) from relay panel assembly (5).

(8) Remove relay panel assembly (5) from the searchlight housing.

b. Replacement.

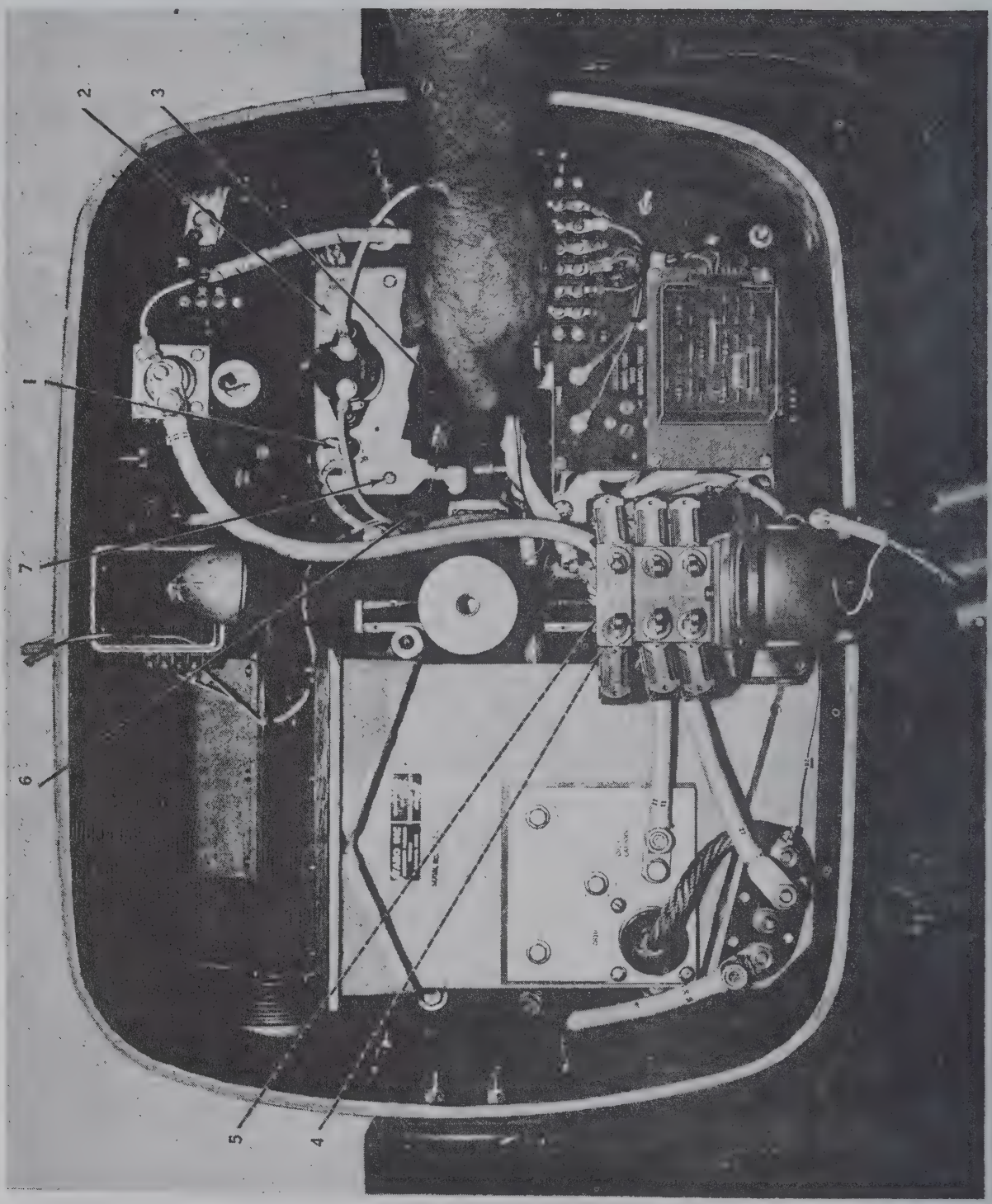
(1) Position relay panel assembly (5) into its original position within the searchlight housing.

(2) Replace four screws (4) to secure relay panel assembly (5).



1 High-voltage cable 8
2 Slide cover 13A8A1
3 Igniter assembly 14
4 Converter assembly 16
5 Drive motor harness assy 4
6 Motor drive assy 4A1
7 Resistor 13A1A1R19
8 Diode 13CR9 or 10
9 Blower assy cover 13A8
10 Searchlight housing assy 17
11 Captive screws
12 Screws 4A1H1
13 Washers 4A1H2
14 Bracket 4A1A1
15 Tubular spring pin 4A1MP2
16 Gear 4A1MP1
17 Shaft

Figure 3—10. Igniter assembly, removal.



1 Diode 15CR2
2 Relay panel cover 15A1A1MP1
3 Relay panel 15
4 Converter relay 17K14
5 Overdrive relay 17K2
6 Connecting plug 17A4P3
7 Screws

Figure 3—11. Relay panel assemblies (Varo model 9922 and Melpar model F40015) removal.

(3) Reconnect wires to CB1 (3) as coded in removal.

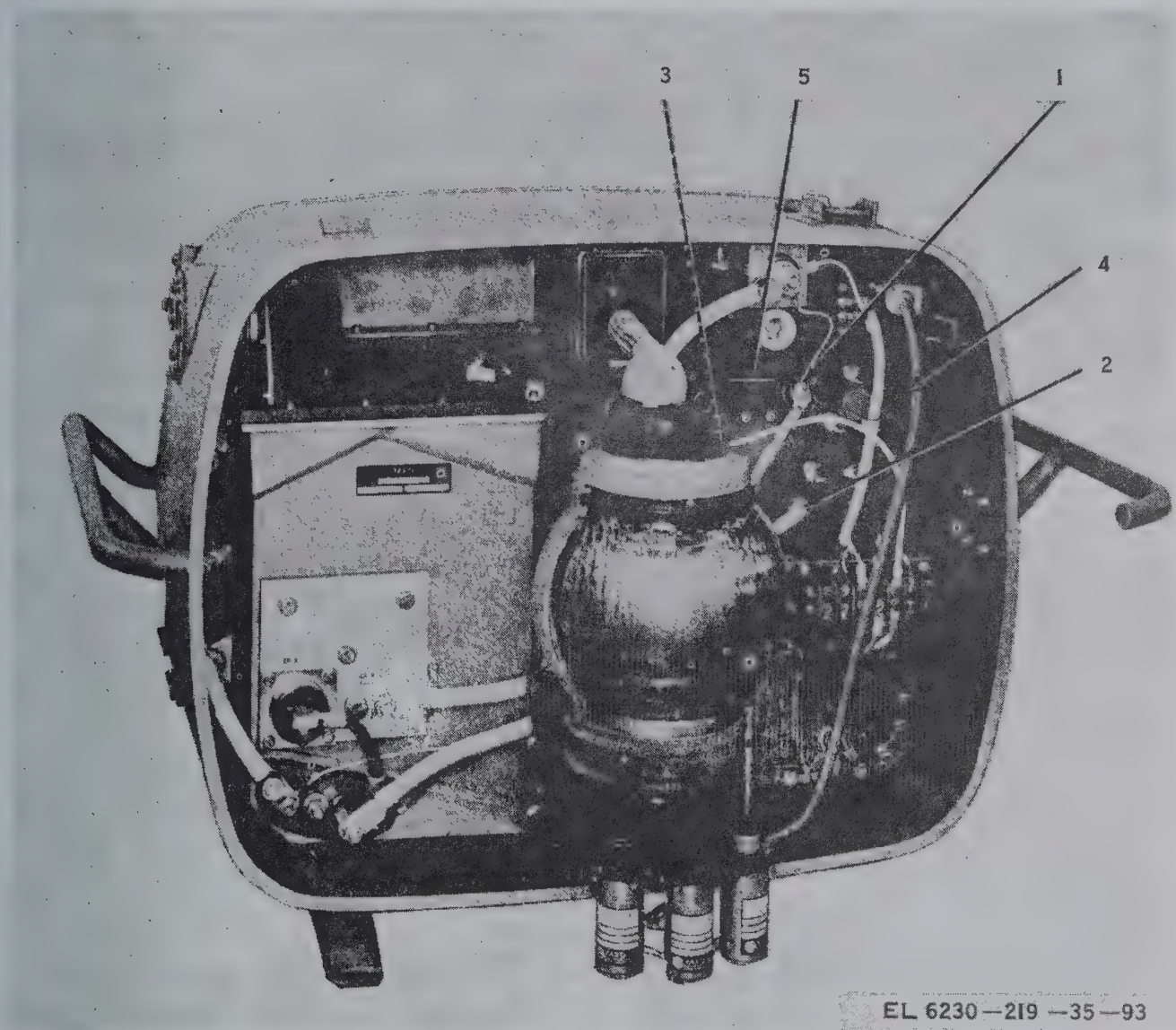
(4) Reconnect cables to J6 (1) and J4 (2) as coded in removal.

(5) Replace the primary reflector (para 3—26).

(6) Replace the xenon lamp (para 3—25).

(7) Replace the lamp cover (para 3—24).

(8) Replace the cowling assembly (para 3—23).



1 Connector J6
2 Connector J4
3 CB1
4 Screw
5 Relay panel assembly

Figure 3—12. Relay panel assembly (Varo model 9913) removal.

3-33. Input Filter

(fig. 3—13)

The input filter is used to suppress radio interference. Essentially, suppression is attained by providing a low-resistance path to ground for stray currents. The methods used include shielding the ignition and high-frequency wires, grounding the frame with bonding straps, and using capacitors and resistors. For general information on radio interference suppression, refer to TM 11—483. To troubleshoot the input filter, test the capacitors for leaks and shorts in a capacitor tester; replace defective capacitors. If test equipment is not available, and interference is indicated, isolate the cause of interference by the trial-and-error method of replacing each capacitor in turn until the cause of interference is located and eliminated. To remove input filter capacitors, proceed as follows:

a. Removal.

(1) Remove the relay panel assembly (para 3—31 and 3—32).

(2) Remove two screws (1) that secure shield box cover (2) to input filter box (3).

(3) Remove one end of bonding strap (4) and shield box cover (2).

(4) Remove the attaching hardware securing capacitors C19 (5), C20 (6), C21 (7), C22 (8), C23 (9), and C24 (10) to input filter box (3). Tag and disconnect electrical leads as necessary.

b. Replacement.

(1) Reconnect electrical leads as coded in removal (*a*(4) above).

(2) Replace removed capacitors and secure with attaching hardware.

(3) Secure bonding strap (4) and shield box cover (2) to input filter box (3) with two screws (1).

(4) Replace the relay panel assembly (para 3—31 and 3—32).

3-34. Converter Relay K14

(fig. 3—13 and 3—14)

a. Removal.

(1) Remove the cowling assembly (para 3—23).

(2) Remove the lamp cover (para 3—24).

(3) Remove the xenon lamp (para 3—25).

(4) Remove the primary reflector (para 3—26).

(5) Tag (fig. 3—14) and disconnect wires from relay K14 (located close to the bottom of the searchlight housing assembly). It may be necessary to remove the converter assembly (para 3—29) to make converter K14 more accessible.

(6) Remove (fig. 3—13) screws (11) that secure relay 17K4 to the searchlight housing assembly and remove relay (14).

b. Replacement.

(1) Position relay K14 (14) on the searchlight housing assembly and secure with screws (11) removed in *a*(6) above.

(2) Connect wires to relay (14) as coded in removal (*a*(5) above).

(3) Replace the primary reflector (para 3—26).

(4) Replace the xenon lamp (para 3—25).

(5) Replace the lamp cover (para 3—24).

(6) Replace the cowling assembly (para 3—23).

3-35. Overdrive Relay K2

(fig. 3—13 and 3—14)

a. Removal.

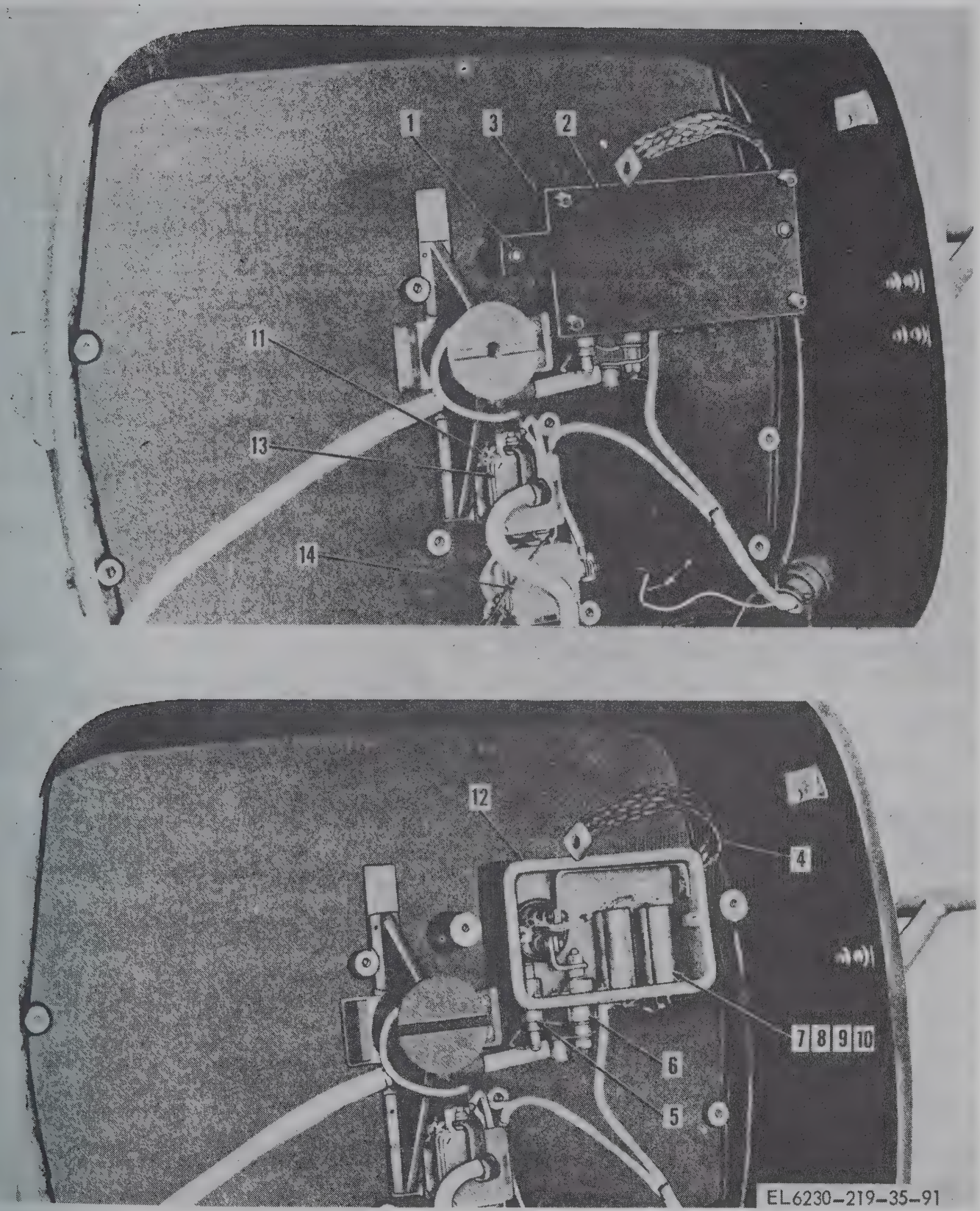
(1) Remove the cowling assembly (para 3—23).

(2) Remove the lamp cover (para 3—24).

(3) Remove the xenon lamp (para 3—25).

(4) Remove the primary reflector (para 3—26).

(5) Tag (fig. 3—14) and disconnect wires from relay K2. It may be necessary to remove the converter assembly (para 3—29) to make overdrive relay K2 more accessible.



1 Screws
2 Shield box cover
3 Input filter box
4 Bonding strap
5 C19
6 C20
7 C21
8 C22
9 C23
10 C24
11 Screws
12 Rf gasket
13 Relay 17K2
14 Relay 17K4

Figure 3—13. Input filter capacitor removal.

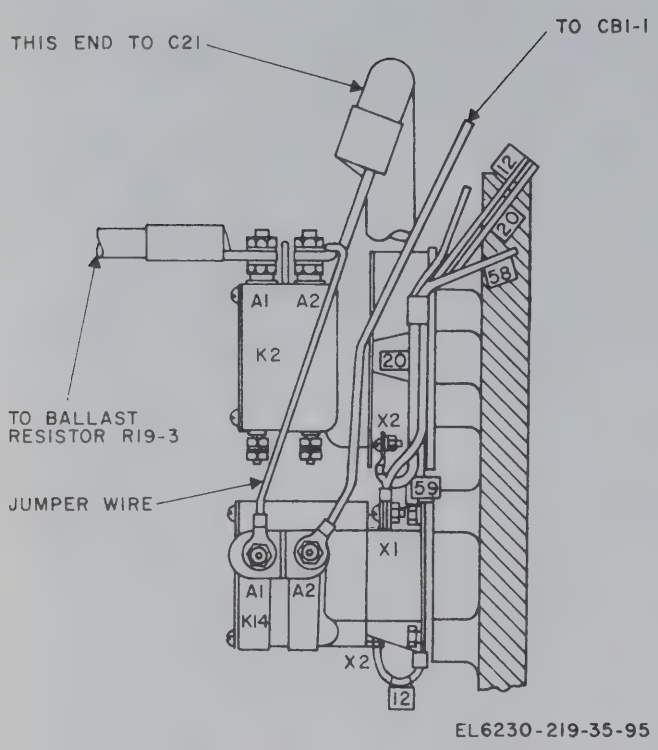


Figure 3—14. Relay K14 and K2 removal.

(6) Remove screws (11) that secure relay K2 (13) to the searchlight housing assembly and remove relay K2.

b. Replacement.

(1) Position (fig. 3—14) overdrive relay K2 (13) on the searchlight housing assembly and secure with screws (11) (fig. 3—13) removed in *a*(6) above.

(2) Connect (fig. 3—13) wires to relay K2 (13) as coded in removal (*a*(5) above).

(3) Replace the primary reflector (para 3—26).

(4) Replace the xenon lamp (para 3—25).

(5) Replace the lamp cover (para 3—24).

(6) Replace the cowling assembly (para 3—23).

3-36. Thermal Switch S7

(fig. 3—8)

a. Removal.

(1) Remove the cowling assembly (para 3—23).

(2) Remove the lamp cover (para 3—24).

(3) Remove the xenon lamp (para 3—25).

(4) Remove the lamp housing assembly (para 3—27).

(5) Remove screws (18) that secure bracket (19) to lower elbow (4). Remove the wire connected to the ground terminal on lower elbow (4) and remove bracket (19) and drive motors (6), (7), and (8).

NOTE

Wiring does not allow complete removal.

(6) Remove the screws that secure thermal switch S7 (5) located inside lower elbow (4).

(7) Tag and disconnect wires connected to thermal switch S7 (5).

b. Replacement.

(1) Connect wires to thermal switch S7 (5) as coded in removal (*a*(7) above).

(2) Secure thermal switch S7 (5) to the inside of lower elbow (4) with the screws removed in *a*(6) above.

(3) Replace the ground terminal wire on lower elbow (4).

(4) Position bracket (19) and drive motors (6), (7), and (8) on lower elbow (4) and secure with screws (18) removed in *a*(5) above.

(5) Replace the lamp housing assembly (para 3—27).

(6) Replace the xenon lamp (para 3—25).

(7) Replace the lamp cover (para 3—24).

(8) Replace the cowling assembly (para 3—23).

3-37. Thermal Switch S8

(fig. 3—5 and 3—15)

a. Removal.

(1) Remove the cowling assembly (para 3—23).

(2) Remove the lamp cover (para 3—24).

(3) Remove (fig. 3—5) screws (7) that secure elbow cover (1) to upper elbow (4) and snap off elbow cover (1).

(4) Place elbow cover (1) on top of searchlight housing subassembly (8).

(5) Loosen (fig. 3—15) nut (2) securing clamp (3) to thermal switch S8 (4).

(6) Tag and disconnect leads to thermal switch S8 (4).

b. Replacement.

(1) Reconnect (fig. 3—15) leads to thermal switch S8 (4) as coded in removal (*a*(6) above).

(2) Place clamp (3) on thermal switch S8 (4) and secure by tightening nut (2).

(3) Place (fig. 3—5) elbow cover (1) on upper elbow (4) and secure with screws (7).

(4) Replace the lamp cover (para 3—24).

(5) Replace the cowling assembly (para 3—23).

3—38. Diode CR9 or CR10

(fig. 3—1)

NOTE

On AN/VSS—1 this diode is referred to as CR9; on all other models of the searchlight it is referred to as CR10.

a. Removal.

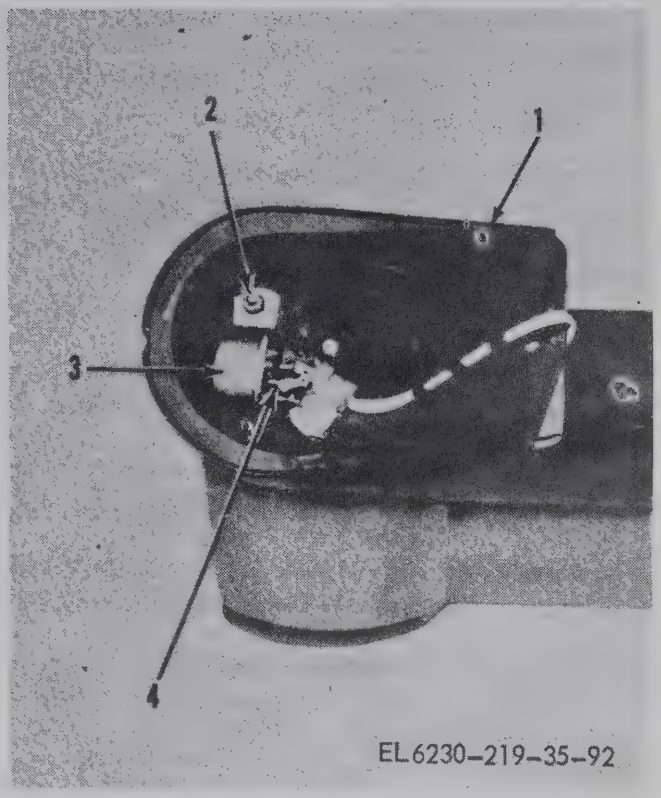
(1) Remove the cowling assembly (para 3—23).

(2) Remove the lamp cover (para 3—24).

(3) Remove the xenon lamp (para 3—25).

(4) Remove the nut, the flat washer, and the lockwasher securing the diode cable to terminal 1 of R19 (24).

(5) Remove four mounting screws (33) holding diode CR9 or CR10 (25) to heat exchanger assembly (28).



1 Cover
2 Nut
3 Clamp
4 Thermal switch S8

Figure 3—15. Thermal switch S8 removal.

(6) Lift diode CR9 or CR10 (25) from recessed position on heat exchanger assembly (28).

b. Replacement.

(1) Position diode CR9 or CR10 (25) into recessed position on heat exchanger assembly (28).

(2) Secure diode CR9 or CR10 (25) to the heat exchanger assembly with four mounting screws (33).

(3) Place connector end of the diode cable on terminal 1 of ballast resistor (24) and secure with the lockwasher, the flat washer, and the nut.

(4) Replace the xenon lamp (para 3—25).

(5) Replace the lamp cover (para 3—24).

(6) Replace the cowling assembly (para 3—23).

3—39. Lower Elbow

(fig. 3—9 and 3—16)

a. Removal.

(1) Remove the cowling assembly (para 3—23).

(2) Remove the lamp cover (para 3—24).

(3) Remove the xenon lamp (para 3—25).

(4) Remove the lamp housing assembly (para 3—27).

(5) Remove (fig. 3—16) wires No. W45 through W49 and wire No. W37 from mode limit switches 5S1 through 5S5. Be sure to tag wires.

(6) Tag (fig. 3—9) and disconnect wires from thermal switch (8) located in lower elbow (7).

(7) Remove four screws (9) and washers (10) securing lower elbow (7) to searchlight housing (2).

(8) Remove lower elbow (7).

b. Replacement.

(1) Position lower elbow (7) onto searchlight housing (2) and secure with four screws (9) and washers (10).

(2) Reconnect wires to thermal switch (8) as coded in removal.

(3) Reconnect wires No. W45 through W49 and wire No. W37 to mode limit switches 5S1 through 5S5 as coded in removal (fig. 3—16).

(4) Replace the xenon lamp (para 3—25).

(5) Replace the lamp cover (para 3—24).

(6) Replace the cowling assembly (para 3—23).

3—40. Relay Panel Diode CR2

(fig. 3—1 and 3—17)

a. Removal.

(1) Remove the cowling assembly (para 3—23).

(2) Remove the lamp cover (para 3—24).

(3) Remove the xenon lamp (para 3—25).

(4) Remove the primary reflector (para 3—26).

(5) Disconnect (fig. 3—1) connector (12) from relay panel assembly (11).

(6) Tag and remove wires from terminals 1 and 2 of circuit breaker (10).

(7) Remove two screws (33) securing cover assembly (34) to the searchlight subassembly. Lift off cover assembly (34).

(8) Remove wires No. W16, W18, and W19 from diode (9).

(9) Remove (fig. 3—17) nut (5), lockwasher (4), flat washer (6), Teflon washer (3), mica washer

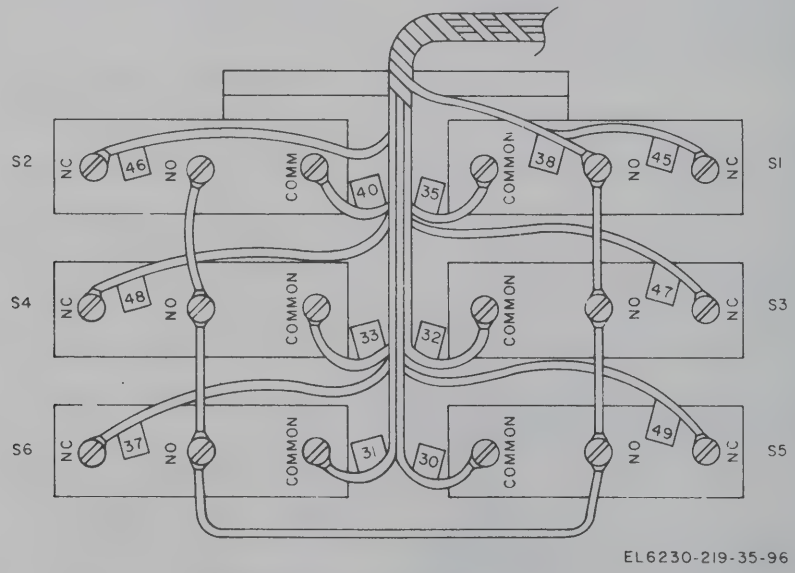


Figure 3—16. Hookup of cable assembly to mode limit switches.

(8), and terminal lug (2) securing diode (1) to the cover assembly.

b. Replacement.

(1) Replace (fig. 3—17) diode (1) on the cover assembly and secure with terminal lug (2), mica washer (8), Teflon washer (3), flat washer (6), lockwasher (4), and nut (5).

(2) Reconnect wires No. W16, W18, and W19 to diode CR2.

(3) Position (fig. 3—1) cover assembly (34) on the searchlight housing subassembly and secure with two screws (33).

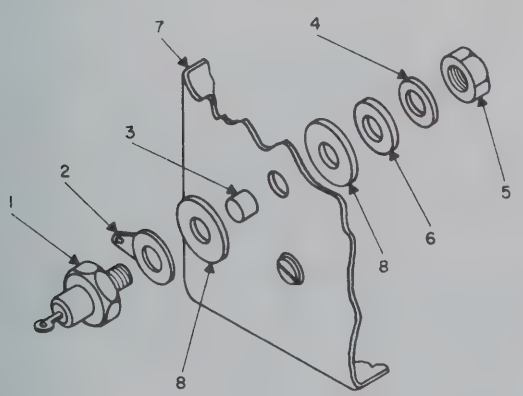
(4) Reconnect connector (12) to relay panel assembly (11).

(5) Replace the primary reflector (para 3—26).

(6) Replace the xenon lamp (para 3—25).

(7) Replace the lamp cover (para 3—24).

(8) Replace the cowling assembly (para 3—23).



EL6230-219-35-97

1 Diode CR2
2 Terminal lug
3 Teflon washer
4 Lockwasher
5 Nut
6 Flat washer
7 Cover
8 Mica washer

Figure 3—17. Relay panel diode CR2 removal.

3—41. High-Voltage Cable

(fig. 3—5 and 3—8)

a. Removal.

(1) Remove the cowling assembly (para 3—23).

(2) Remove (fig. 3—5) two screws (7) that secure elbow cover (1) to upper elbow (4) and snap off elbow cover (1).

NOTE

Wiring in elbow cover (1) does not allow for complete removal.

(3) Place elbow cover (1) on top of searchlight housing assembly (8).

(4) Slip the lamp bail off of the high-voltage cable.

(5) Remove (fig. 3—8) slide cover (1) by sliding it straight out.

(6) Unscrew P1 from the connector on igniter assembly (2).

(7) Pull the high-voltage cable out of the upper elbow.

b. Replacement.

(1) Insert the high-voltage cable into the upper elbow with the connector end in first.

(2) Screw P1 on to the connector on igniter assembly (2).

(3) Replace (fig. 3—8) slide cover (1) by sliding it straight in.

(4) Slip the lamp bail on top of the high-voltage cable.

(5) Remove (fig. 3—5) elbow cover (1) from the top of searchlight housing assembly (8) and position it on upper elbow (4).

(6) Secure elbow cover (1) to upper elbow (4) with two screws (7).

(7) Replace the cowling assembly (para 3—23).

3—42. Drive Motor

(fig. 3—10)

a. Removal.

(1) Remove the cowling assembly (para 3—23).

(2) Remove the lamp cover (para 3—24).

(3) Remove the xenon lamp (para 3—25).

(4) Disconnect (fig. 3—10) and tag drive motor harness assembly (5) from motor drive assembly (6) to be removed.

(5) Remove four screws (12) and washers (13) from bracket (14).

(6) Drive tubular spring pin (15) out of gear (16). Remove gear (16).

(7) Withdraw motor drive assembly (6) as applicable from bracket (14).

b. Replacement.

(1) Insert motor drive assembly (6) into bracket (14).

(2) Replace gear (16) on shaft of motor drive assembly (6).

(3) Replace tubular spring pin (15) and secure gear (16) to shaft (17).

(4) Reconnect drive motor harness assembly (5) to the motor as coded in removal.

(5) Replace the xenon lamp (para 3—25).

(6) Replace the lamp cover (para 3—24).

(7) Replace the cowling assembly (para 3—23).

3—43. Relay Panel Circuit Breaker CB1

(fig. 3—8)

a. Removal.

(1) Remove the cowling assembly (para 3—23).

(2) Remove the lamp cover (para 3—24).

(3) Remove the xenon lamp (para 3—25).

(4) Remove the primary reflector (para 3—26).

(5) Tag (fig. 3—8) and disconnect the wires from terminals 1 and 2 of CB1.

(6) Remove two screws (21) securing circuit breaker (20) to cover assembly (22).

(7) Lift circuit breaker (20) off of cover assembly (22).

b. Replacement.

(1) Position circuit breaker (20) on cover assembly (22).

(2) Replace two screws (21) and secure circuit breaker (20) to cover assembly (22).

(3) Reconnect wires to terminals 1 and 2 of circuit breaker (20) as coded in removal.

(4) Replace the primary reflector (para 3—26).

(5) Replace the xenon lamp (para 3—25).

(6) Replace the lamp cover (para 3—24).

(7) Replace the cowling assembly (para 3—23).

3—44. Blower Motor Brushes

(fig. 3—18)

Blower motor brushes will be replaced after no more than 400 hours of operation. To replace blower motor brushes, proceed as follows:

a. Removal.

(1) Remove the blower assembly (para 3—28).

(2) Remove six screws (1) that secure blower elbow (2) to the blower assembly. Remove blower elbow (2).

(3) Remove brush spring (3) and brush (4) from blower motor (5).

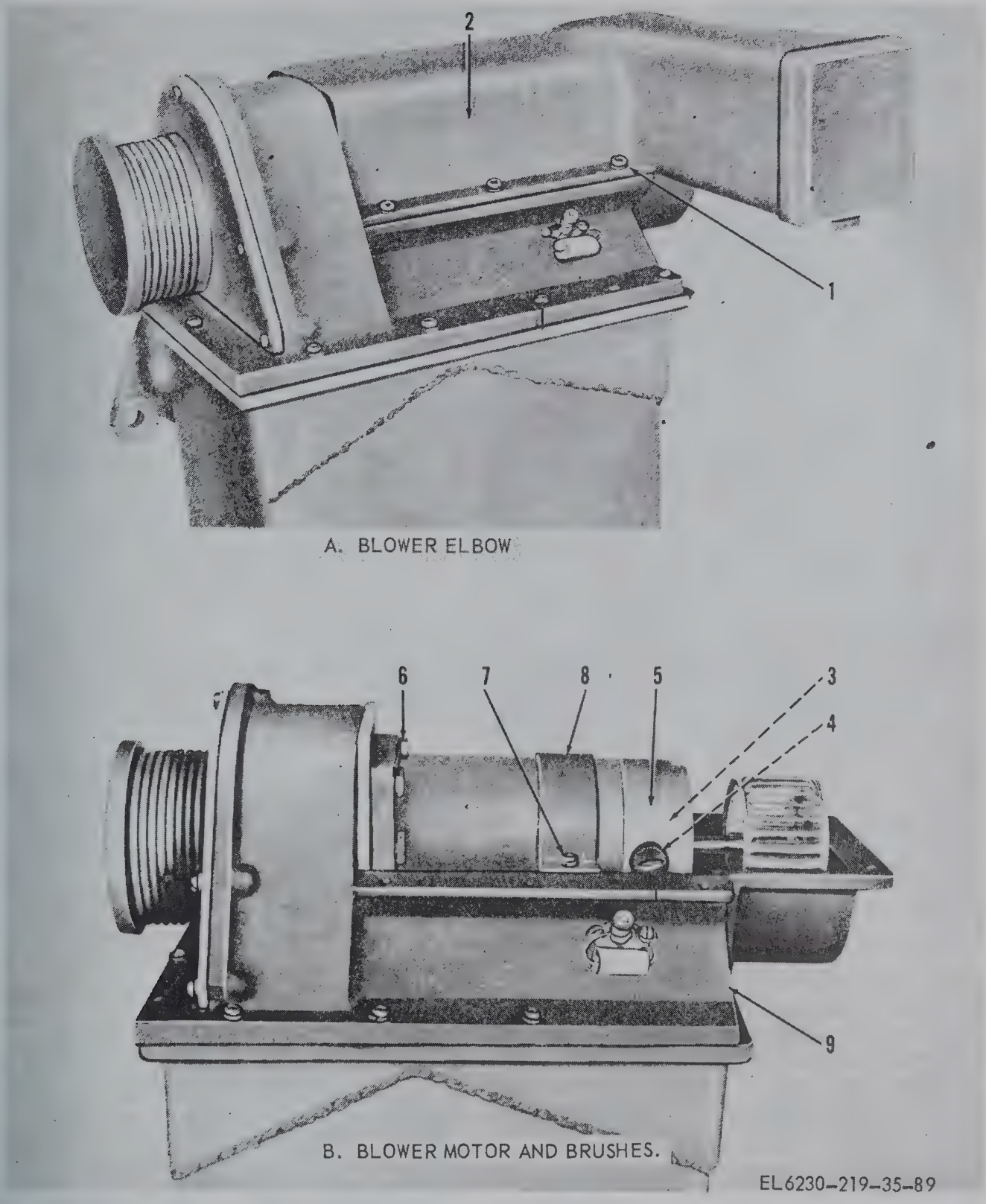
NOTE

Figure 3—18 shows only the front side of the blower motor and thus only one brush location. Remove the other brush from the back side of the blower motor in a similar manner.

b. Replacement.

(1) Insert new brush spring (3) and brush (4) into blower motor (5) receptacle.

(2) Position blower elbow (2) on blower assembly (9).



1 Screw
2 Blower elbow
3 Brush spring
4 Brush
5 Blower motor
6 Screw
7 Screw
8 Bracket
9 Blower assembly

Figure 3—18. Blower motor and brush removal.

(3) Secure blower elbow (2) to blower assembly (9) with six screws (1).

(4) Replace the blower assembly (para 3—28).

3-45. Blower Motor
(fig. 3—18)

Refer to TM 5—764 for motor testing procedures.

a. Removal.

(1) Remove the blower assembly (para 3—28).

(2) Remove six screws (1) that secure blower elbow (2) to blower assembly (9).

(3) Remove two screws (7) that secure bracket (8) to blower assembly (9). Remove bracket (8).

(4) Remove four screws (6) that secure blower motor (5) to blower assembly (9).

(5) Lift blower motor (5) out of blower assembly (9).

b. Replacement.

(1) Position blower motor (5) into blower assembly (9).

(2) Secure blower motor (5) in blower assembly (9) with four screws (6).

(3) Position bracket (8) over blower motor (5).

(4) Secure bracket (8) to blower assembly (9) with two screws (7).

(5) Replace the blower assembly (para 3—28).

NOTE

If the replacement blower motor has two black wires install the blower motor and observe for proper rotation. Looking at the motor from the air intake vent, motor rotation must be clockwise. If it is not, reverse the motor leads.

3-46. Blower Inlet and Outlet Screens
(fig. 3—19)

a. Removal.

(1) Remove eight screws (1) that secure blower inlet screen (2) to searchlight subassembly (3).

(2) Remove 12 screws (4) that secure blower outlet screen (5) to searchlight subassembly (3).

b. Replacement.

(1) Position blower outlet screen (5) on searchlight subassembly (3).

(2) Secure blower outlet screen (5) to searchlight subassembly (3) with screws (4).

(3) Position blower inlet screw (2) on searchlight subassembly (3).

(4) Secure blower inlet screen (2) to searchlight subassembly (3) with screws (1).

3-47. Mount, Universal MT-3900/GSS-14
(fig. 6—18)

a. Disassembly.

(1) Remove nut (1), washer (2), and bolt (3) holding shock absorber shaft (4) by rotating counterclockwise freeing shaft bearing (5); slide shaft bearing off of shaft after withdrawing shaft.

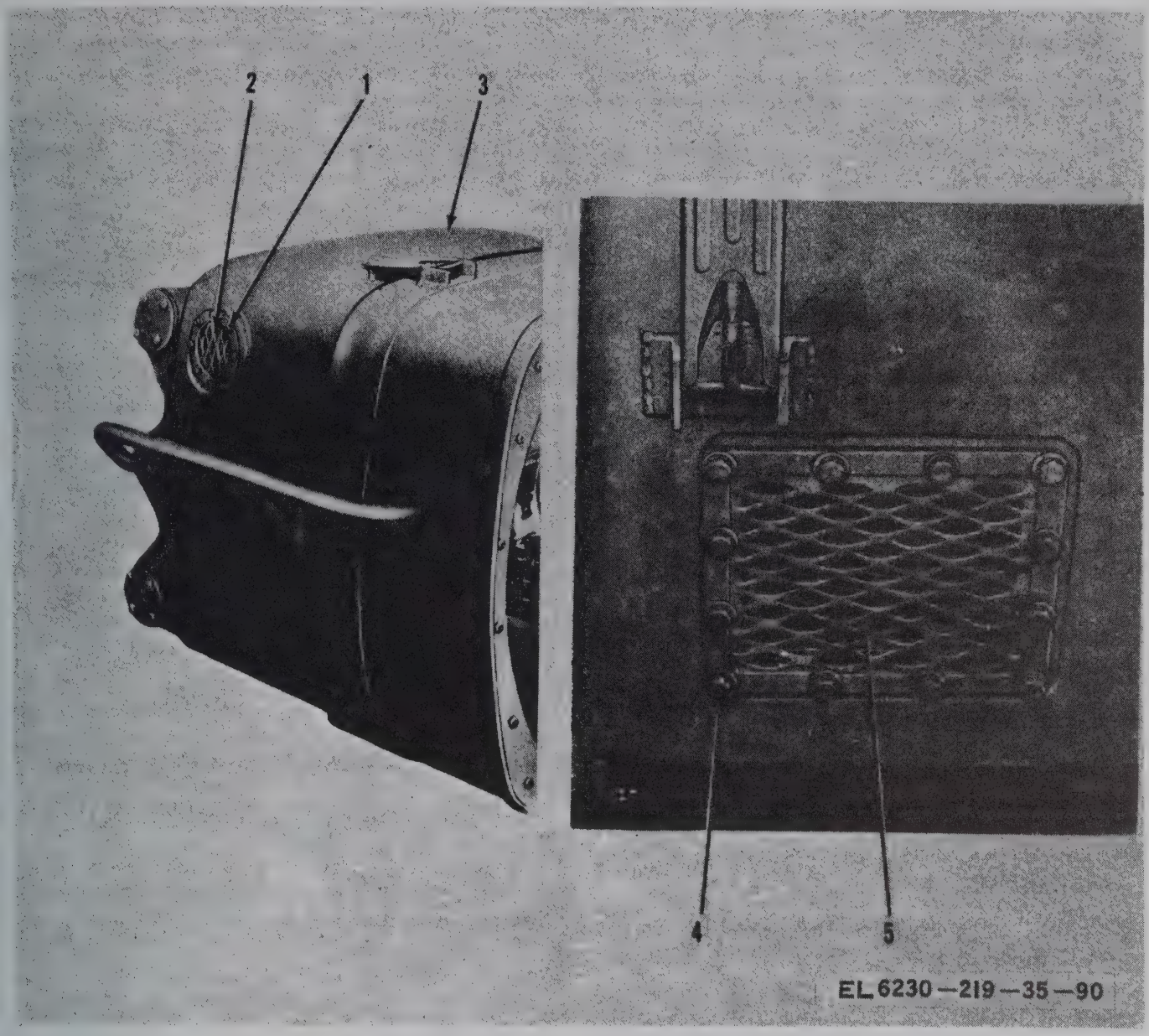
(2) Unscrew bottom cap (6) and top cap assembly (7) from shock absorber tube; unscrew spring assembly from top cap assembly.

(3) Remove four bolts (11), lockwashers (10), and nuts (9) holding yoke assembly to pedestal assembly; lift yoke assembly clear of pedestal. Remove rubber pad from top of pedestal.

(4) Place pedestal on bench with azimuth ring down; remove eight hex cap screws (14), washers (13), and nuts (12) holding mounting plate to pedestal; lift mounting plate off pedestal.

(5) Place pedestal on bench with azimuth ring up; remove two cap screws (18), washers (16 and 17), and nuts (15) extending through lower race holding upper race. Lift upper race (19) straight up carefully noting number of shims and placement of shim spacers. Remove shims and shim spacers from the two through screw locations reassembling the through screw, washer, shims, shim spacer, washer, and nut finger tight, to prevent loss. Lift remaining shims and shim spacers from lower race.

(6) Remove 53 red bearing balls (31) and 53 white spacer balls (31) from lower race; lift lower



1 Screw
2 Blower inlet screen 11MP16
3 Searchlight subassembly
4 Screw
5 Blower outlet screen 11MP2

Figure 3—19. Blower inlet and outlet screen removal.

race (20) from pedestal. Remove inner felt seal (21) from lower race; clean with toulene.

(7) Remove two screws (22), split washers (23), flat washers (24), holding brake knob assembly; remove bolt (25) holding brake shoe assembly (26), and brake knob (27), remove two halves of brake knob retaining cap (28); lift brake knob (27), brake shim (29), and brake guide (30) off upper race.

(8) Clean, inspect, and repair (para 3—20*b*).

b. Reassembly.

(1) Replace brake guide (30), brake shim (29), and brake knob (27) on upper race (19). Secure the brake knob to the brake guide with retaining cap (28), screws (22), split washers (23), and flat washers (24).

(2) Replace holding brake shoe assembly (26) with bolt (25) to the upper race.

(3) Replace inner felt seal (21) around the lower race.

(4) Replace the lower race on the pedestal.

(5) Replace 53 red bearing balls (31) and 53 white spacer balls (31).

(6) Replace the shims and shim spacers that were removed in *a*(5) above.

(7) Replace the upper race over the lower race. Secure with cap screws (18), washers (16 and 17), and nuts (15).

(8) Replace mounting plate to the pedestal with eight hex cap screws (14), washers (13), and nuts (12).

(9) Replace the rubber pad and secure the yoke assembly to the pedestal with four bolts (11), lockwashers (10), and nuts (9).

(10) Insert the spring assembly into the shock absorber tube. Screw the shock absorber tube to top cap assembly (7). Screw the other end of the shock absorber tube to bottom cap (6). Secure the bottom cap to the pedestal with bolt (3), washer (2), and nut (1). Screw the shock absorber shaft to top cap assembly (7).

3-48. Mount, Searchlight MT-3900A/GSS-14 (fig. 3—20 through 3—25)

a. Removal.

(1) Unsolder (fig. 3—20) the wires connected to the indicator light housing secured to the light bracket (7) on the level assembly.

(2) Remove plastic cable clamps (6) and associated hardware (3, 4, and 5) securing the cable harness (9) to mounting bracket.

(3) Disconnect plugs P1 (1) and P3 (2) from the universal control box.

(4) Pull the cable harness (9) containing three cables down through the large cable clamp (not shown).

(5) Remove (fig. 3—21) elevation handwheel (2) from the right side of the yoke (10) by removing pin (1), and sliding the handwheel off the shaft of the elevation gearbox assembly (11).

(6) Remove elevation brake handwheel (6) from the left side of the yoke (10) by loosening screw (3) and sliding elevation brake handwheel (6) and associated hardware (4, 5, and 7) off the shaft (not shown).

(7) Remove eight screws (8) and flatwashers (9), that secure the universal searchlight subassembly to the yoke.

WARNING

Do not stand close to or lie under the universal searchlight assembly while it is supported only by the forklift, crane, or equivalent. Serious injury or DEATH could result if the equipment fell.

CAUTION

When a forklift is used, pad the arms of the lift with foam rubber or a similar material to prevent damaging of the equipment.

(8) Using a forklift, crane, or equivalent, lift the universal searchlight subassembly (12) out of the yoke (10) and place it carefully on the floor.

(9) Slide (fig. 3—22) bearing block (2) and bearing (1) off the shaft (13).

(10) Remove left elevation plate assembly (5) and disc (4) by removing screws (3).

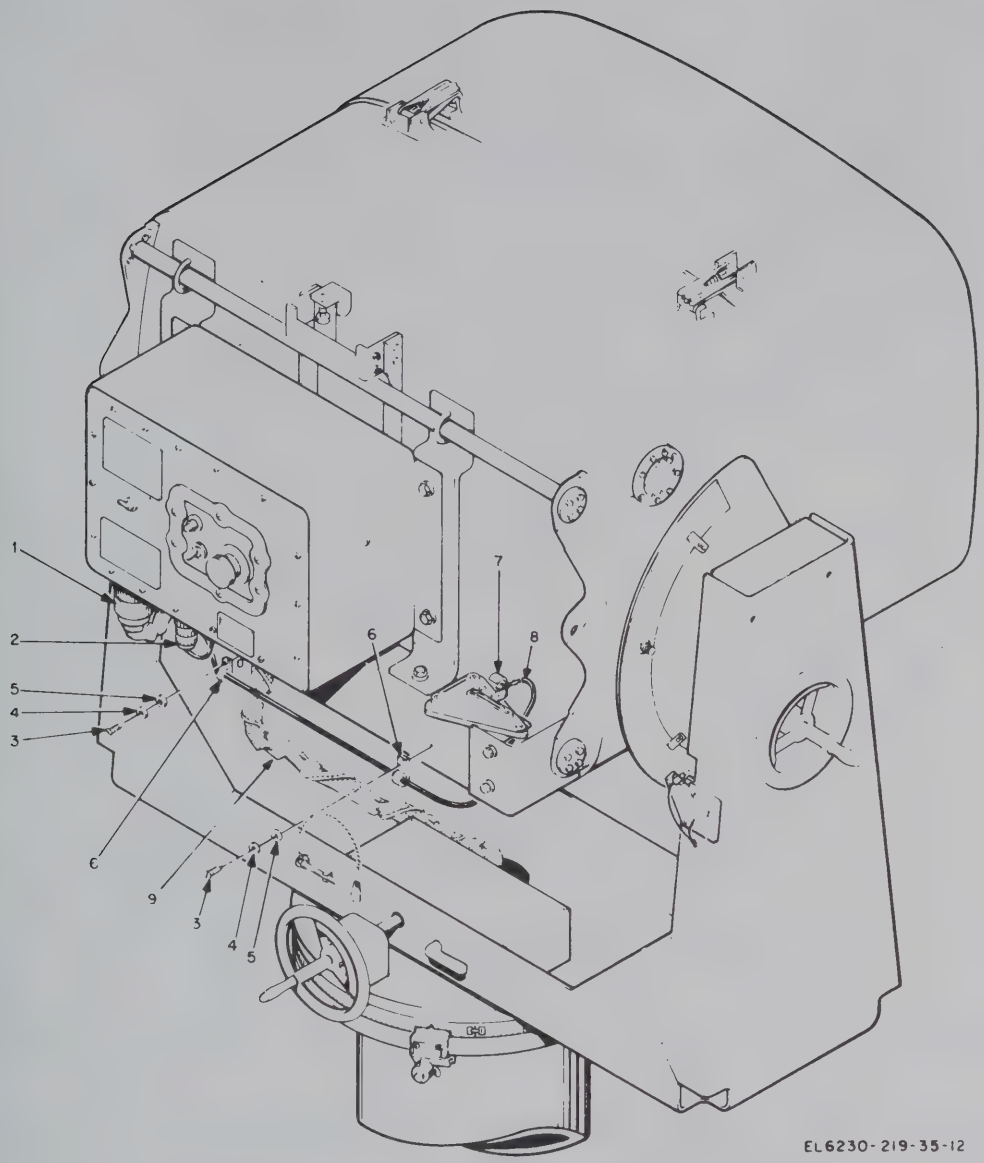
(11) Remove bearing plate (8), brake shaft assembly (13) and associated hardware (6, 7, 9, 10, 11, and 12).

(12) Remove (fig. 3—23) elevation gearbox assembly (1) from the gearbox shaft (12).

(13) Remove right elevation plate assembly (4) and disc (3) by removing screws (2).

(14) Remove bearing plate (7) and gearbox shaft assembly (12) and associated hardware (5, 6, 8, 9, 10, and 11) from the right side of the searchlight.

(15) Remove (fig. 3—24) level assembly (2) from the bracket beside the control box by removing three screws (1).



1 Plug P1
2 Plug P3
3 Pan head screw
4 Split lockwasher
5 Flat washer
6 Plastic cable clamp
7 Light bracket
8 Cable
9 Cable harness

Figure 3—20. Cable clamps, exploded view.

(16) Remove control box (9) from the searchlight by removing nuts (4) and washers (5) from U-bolts (6), and nuts (7) and washers (5) from bolts (8).

(17) Remove (fig. 3—25) handle and associated hardware (1, 2, 3, 4, and 5) from the searchlight.

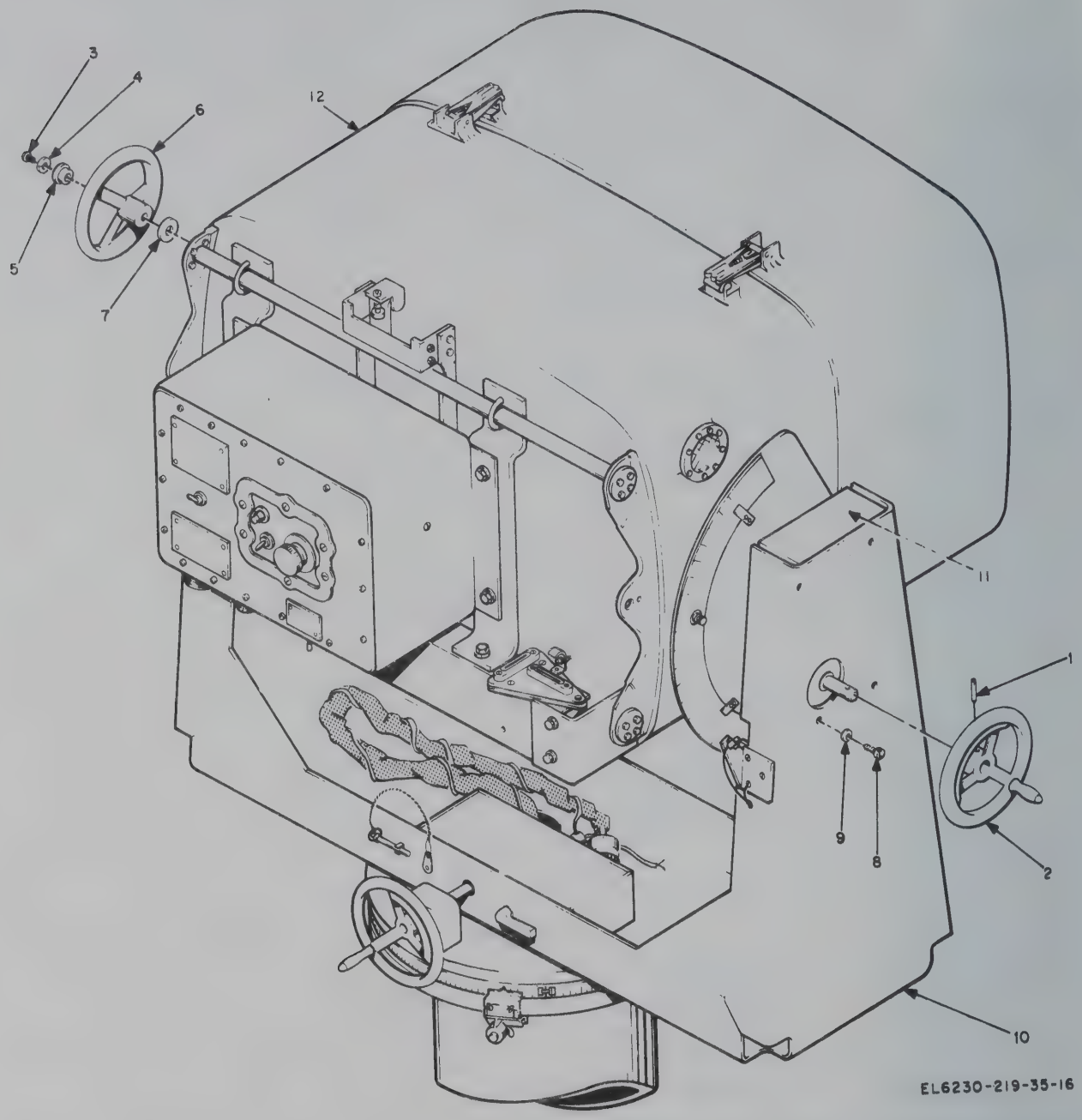
(18) Remove bracket (13), cable clip (8), and associated hardware (1, 2, 3, 4, 5, and 7) from the searchlight.

(19) Disassemble angle mounts (11 and 12) and associated hardware (2, 9, and 10) from bracket (13).

b. Replacement. (fig. 3—20 through 3—23)

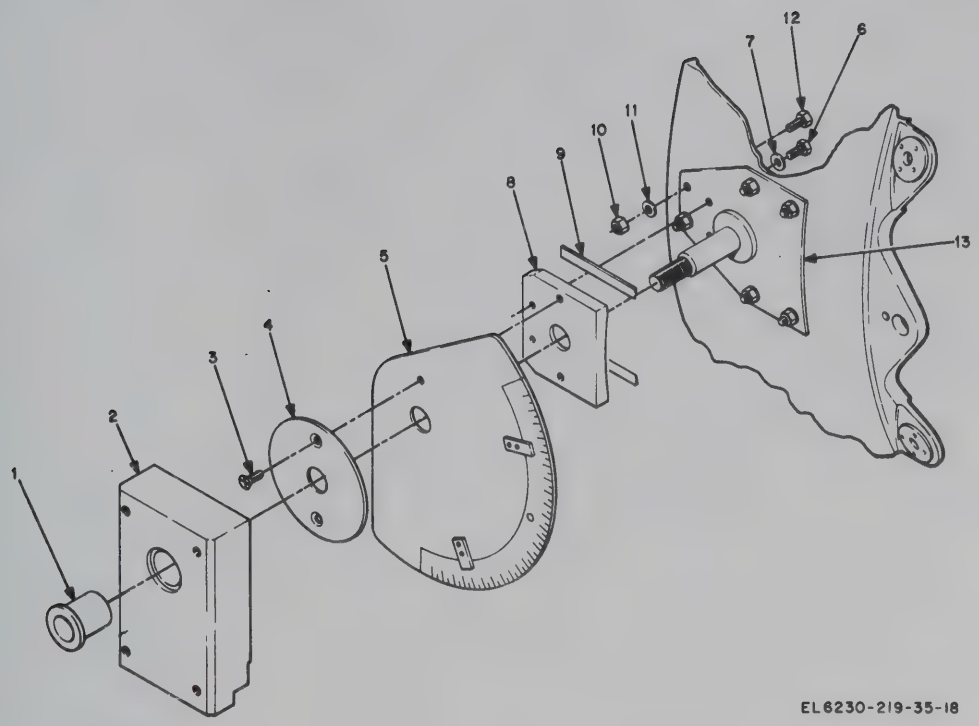
WARNING

While performing the following procedures, be careful not to stand or lie under the searchlight or the universal mount (A) if they are not securely supported. These



1 Pin
2 Elevation handwheel, 8-inch modified
3 Pan head machine screw
4 Split lockwasher
5 Standoff washer
6 Elevation brake handwheel, 6-inch modified
7 Flat washer
8 Round head machine screw
9 Flat washer
10 Yoke
11 Elevation gearbox assembly
12 Universal searchlight subassembly

Figure 3—21. Elevation brake and handwheel, exploded view.



1 Bearing
2 Bearing block
3 Flat head screw
4 Disc
5 Left elevation plate assembly
6 Hexagon head screw
7 Flat washer
8 Bearing plate
9 Curvature block shim
10 Self-locking hexagon nut
11 Flat washer
12 Hexagon head bolt
13 Brake shaft assembly

Figure 3—22. Left bearing assembly, exploded view.

items are very heavy and severe injury or death might result if they were to fall.

(1) Assemble (fig. 3—25) angle mounts (11 and 12) to bracket (13), using applicable hardware (2, 9, and 10).

(2) Mount bracket (13) and cable clamp (8) to the searchlight using applicable hardware (1, 2, 3, 4, and 7).

(3) Attach control handle (16) to the searchlight using applicable hardware (1, 2, 3, 4, and 5).

CAUTION

Handle the level with care as the glass is easily broken.

(4) Attach (fig. 3—24) level assembly (2) to the bracket beside the control box using applicable hardware (1 and 3).

(5) Attach the control box to the control handle and bracket with U-bolts (6), hexagon head bolts (8), and applicable hardware (4, 5, and 7).

(6) Attach (fig. 3—23) gearbox shaft assembly (12) to the right side of the searchlight using applicable hardware (9, 10, and 11).

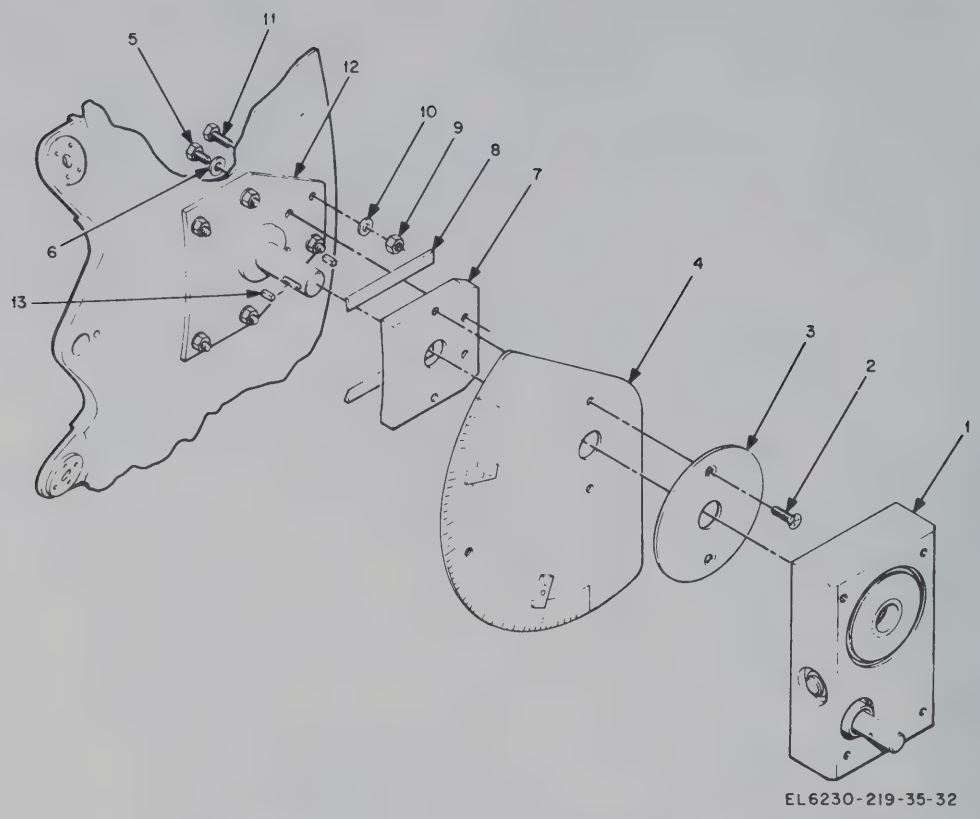
(7) Attach bearing plate (7) to gearbox shaft assembly (12) using applicable hardware (5 and 6). Mount the bearing plate using shims (8), as required, to ensure that the bearing plate is positioned at right angles to the shaft. They may be verified using a T-square.

(8) Attach disc (3) and right elevation plate assembly (4) using flathead screws (2).

(9) Secure keys (13) to the shaft with adhesive per MIL—R—46802.

(10) Slide the elevation gearbox over the shaft.

(11) Attach (fig. 3—22) brake shaft assembly



1 Elevation gearbox assembly
2 Flathead screw
3 Disc
4 Right elevation plate assembly
5 Hexagon head screw
6 Flat washer
7 Bearing plate
8 Curvature block
9 Self-locking hexagon nut
10 Flat washer
11 Hexagon head bolt (6)
12 Gearbox shaft assembly (17)
13 Key (2)

Figure 3—23. Right side bearing assembly, exploded view.

(13) to the left side of the searchlight using applicable hardware (10, 11, and 12).

(12) Attach bearing plate (8) to brake shaft assembly (13) using applicable hardware (6 and 7). Refer to (7) above for shimming instructions.

(13) Attach left elevation plate assembly (5) and disc (4) using applicable hardware (3).

(14) Slide bearing block (2) and bearing (1) onto the shaft using sealant, MIL—R—46802 grade AA or equivalent, to seal the joint between the bearing and the bearing block.

WARNING

Do not stand or lie under the searchlight assembly while it is supported only by the lift. Serious injury or DEATH could result if the searchlight fell.

CAUTION

When a forklift is used, pad the arms of the lift with foam rubber or a similar material to prevent damaging the searchlight.

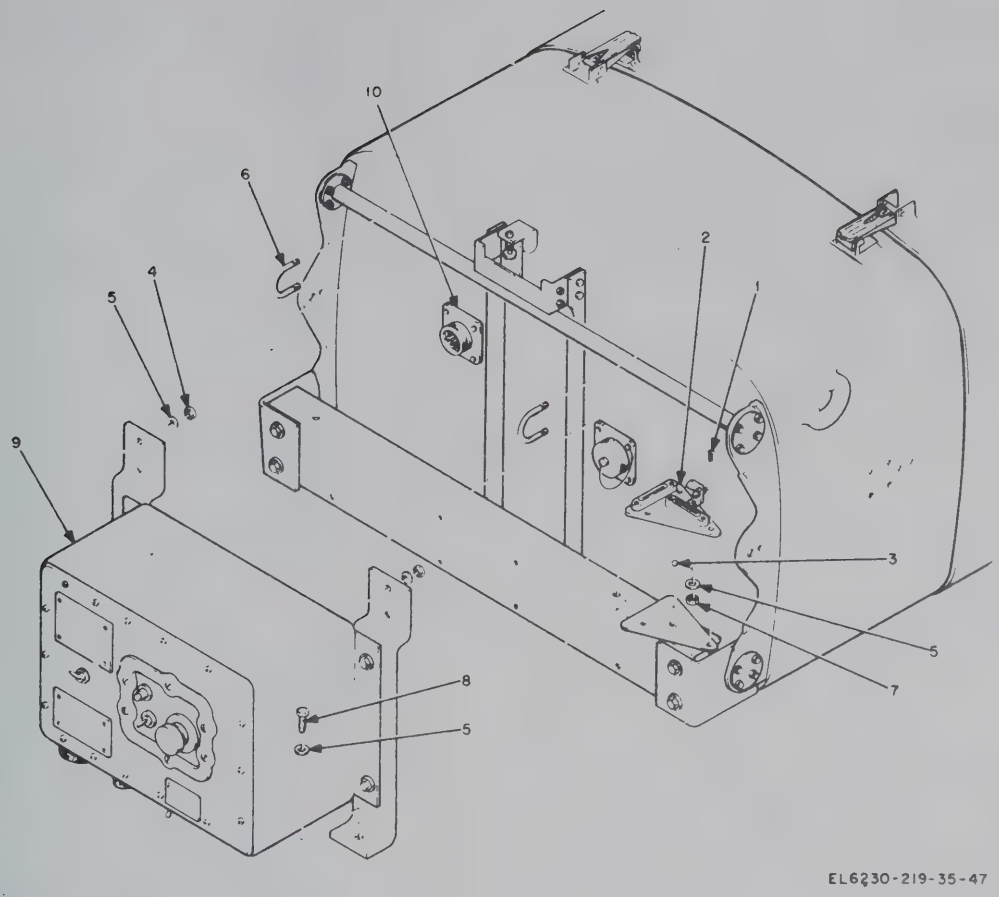
(15) Using a forklift (fig. 3—21), crane, or equivalent, place the searchlight into yoke (10). Keep the forklift in place until the searchlight has been secured in the yoke.

NOTE

Use the forklift, crane, or equivalent to align the holes in the yoke with those in the bearing blocks.

(16) Secure the searchlight to the yoke with the applicable hardware (8 and 9). Remove the lift.

(17) Secure the elevation brake to the left side of the searchlight by sliding washer (7), elevation



1 Pan head machine screw
2 Level assembly
3 Ball bearing
4 Self-locking hexagon nut
5 Flat washer
6 U-bolt
7 Self-locking hexagon nut
8 Hexagon head bolt
9 Universal control box
10 Jack J2

Figure 3—24. Control box and levels, exploded view.

brake handwheel (6), standoff washer (5), and split lockwasher (4) onto the shaft and securing them with pan head machine screw (3).

(18) Secure the handwheel to the right side of the searchlight by sliding elevation handwheel (2) onto the shaft and securing it with pin (1).

(19) Pull the cable harness (fig. 3—20) containing three cables through large cable clip (fig. 3—25, 8).

(20) Connect (fig. 3—20) jacks J1 (1) and J3 (2) to the control box.

(21) Secure the remaining cable to the bracket using cable clips (6) and applicable hardwares (3, 4, and 5).

(22) Slide the plastic cover on the wires of the cable back to expose the wires. Solder the wires to the pins of lamp housing (7).

3—49. Universal Mount (A) Elevation Scale Lamp Assemblies

(fig. 3—26 and 3—27)

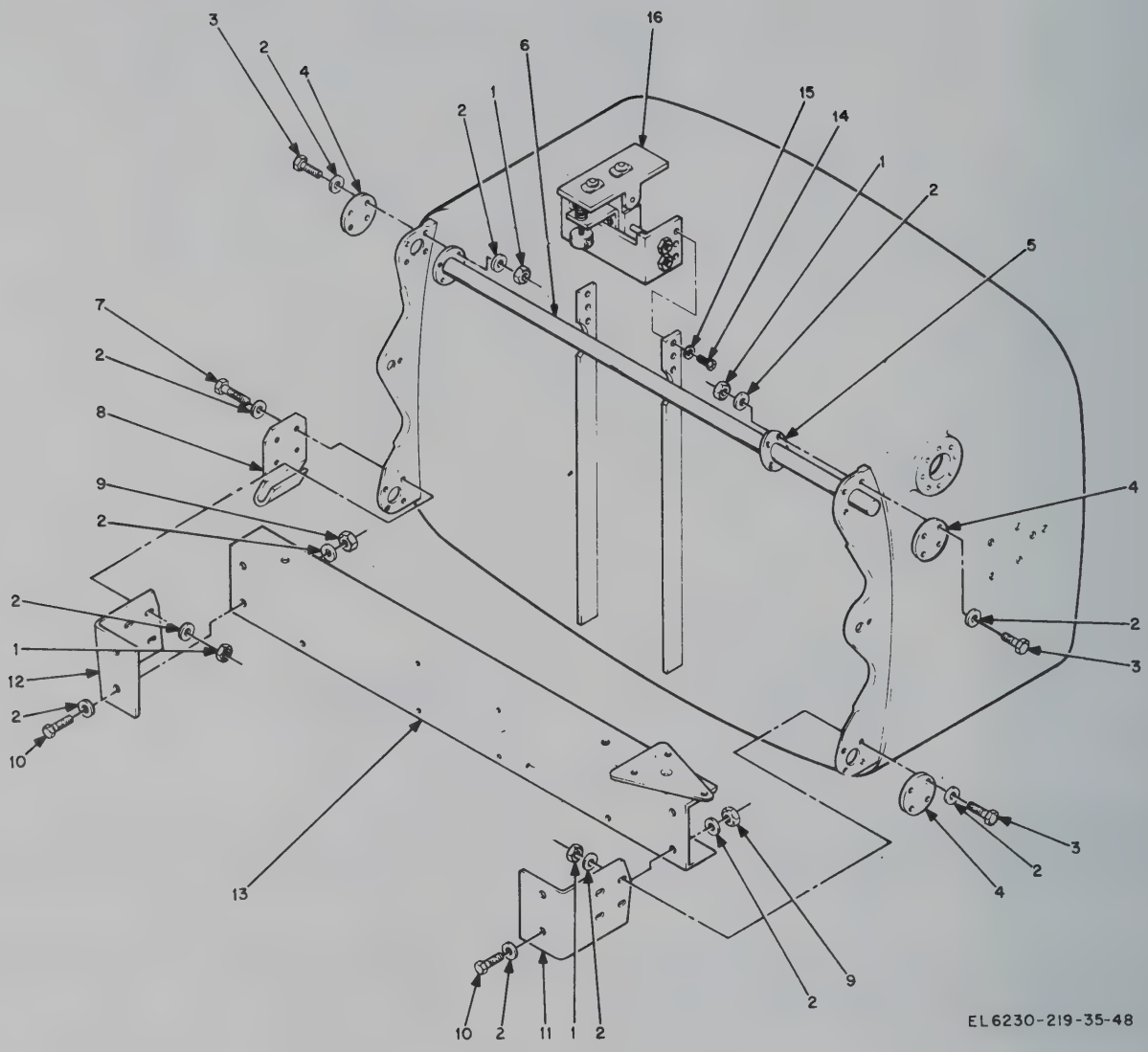
a. Removal (fig. 3—26).

(1) Unsolder the wire connected to the lamp.

(2) Remove screws (21) securing the lamp to the yoke.

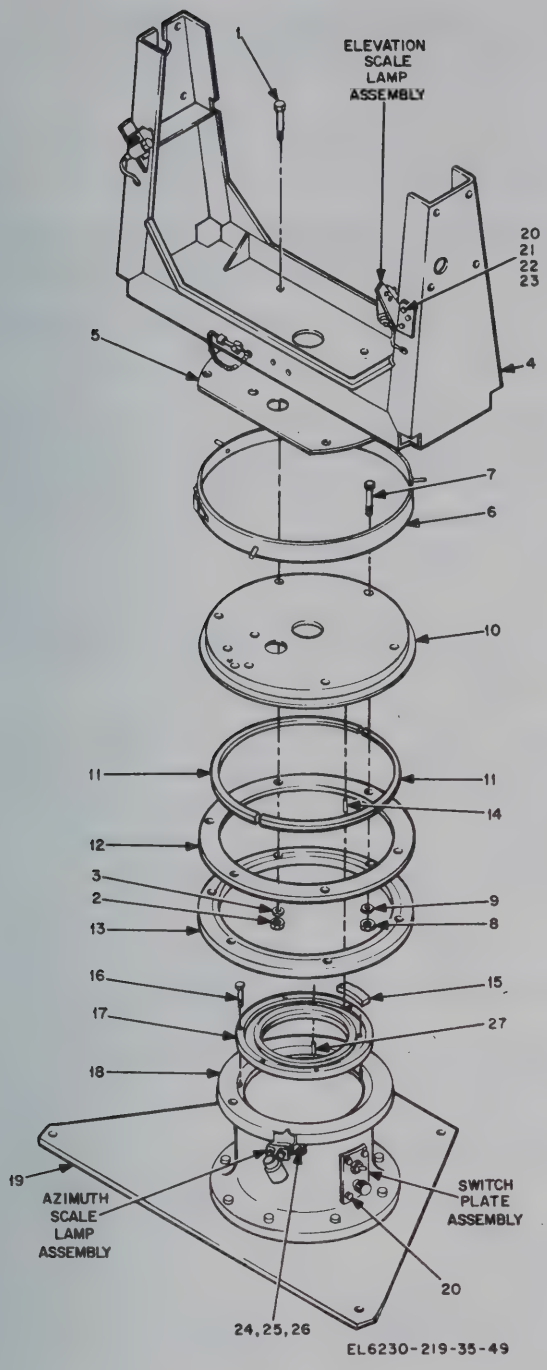
b. Disassembly and Repair (fig. 3—27).

(1) Remove screws (1) and washers (2) that secure lamp bracket (3) and pointer (4) to pointer bracket (5).



1 Self-locking hexagon nut
2 Flat washer
3 Hexagon head bolt
4 Universal cap
5 Handle attaching plate
6 Control handle
7 Hexagon head bolt
8 Cable clip
9 Self-locking hexagon nut
10 Hexagon head bolt
11 Right angle mount
12 Left angle mount
13 Mounting bracket
14 Machine screw
15 Lockwasher
16 Scope mounting assembly

Figure 3—25. Handle and bracket, exploded view.



1 Bolt
2 Nut
3 Washer
4 Yoke
5 Rubber pad
6 Azimuth scale
7 Bolt
8 Nut
9 Washer
10 Upper race
11 Bearing strip
12 Gasket
13 Lower race
14 Pin
15 Shuttle block
16 Screw
17 Azimuth friction ring
18 Pedestal
19 Mounting plate
20 Screw
21 Lockwasher
22 Flatwasher
23 Nut
24 Screw
25 Washer
26 Clamp
27 Pin

Figure 3—26. Universal mount (A), exploded view.

(2) Remove indicator light (6) by loosening setscrew (7).

(3) Clean, inspect, and repair (para 3—20*b*).

c. Reassembly (fig. 3—27).

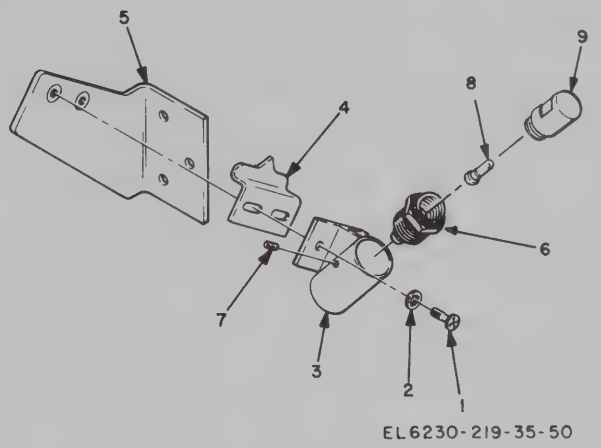
(1) Secure indicator lamp (6) to lamp bracket (3) by tightening setscrew (7).

(2) Fasten lamp bracket (3) and pointer (4) to pointer bracket (5) with screws (1) and washers (2).

d. Replacement (fig. 3—26).

(1) Secure the lamp assembly to the yoke with three screws (21).

(2) Solder the wires to the two pins on the lamp.



1 Screw
2 Washer
3 Lamp bracket
4 Pointer
5 Elevation pointer bracket
6 Light indicator housing
7 Setscrew
8 Incandescent lamp
9 Light indicator lens

Figure 3—27. Elevation scale lamp assembly, exploded view.

3-50. Universal Mount (A) Azimuth Scale Lamp Assemblies

(fig. 3—26 and 3—28)

a. Removal (fig. 3—26).

(1) Unsolder the wire from the lamp assembly.

(2) Remove two screws (22) securing the lamp assembly to the pedestal.

b. Disassembly and Repair (fig. 3—28).

(1) Remove screws (1) and washers (2) that secure plate (3) to pointer bracket (4).

(2) Remove screws (6) and washers (7) that secure lamp bracket (10) to plate (3).

(3) Remove indicator light (9) by loosening setscrew (8).

(4) Clean, inspect, and repair (para 3—20*b*).

c. Reassembly (fig. 3—28).

(1) Secure indicator light (9) in lamp bracket (10) with set screw (8).

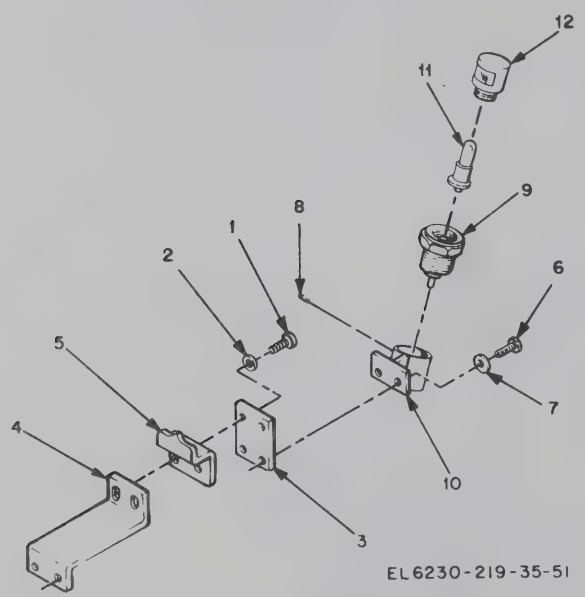
(2) Secure lamp bracket (10) to plate (3), with screws (6) and washers (7).

(3) Fasten plate (3) and pointer (5) to pointer bracket (4) with screws (1) and washers (2).

d. Replacement (fig. 3—26).

(1) Secure the lamp assembly to the pedestal with two screws (22).

(2) Solder the two wires to the lamp.



1 Screw
2 Washer
3 Adapter plate
4 Pointer bracket
5 Pointer
6 Screw
7 Washer
8 Setscrew
9 Light indicator housing
10 Lamp bracket
11 Incandescent lamp
12 Light indicator lens

Figure 3—28. Azimuth scale lamp assembly, exploded view.

3-51. Universal Mount (A) Azimuth Positioning Assembly
(fig. 3—29)

a. Removal (fig. 3—29).

(1) Remove four screws (1) and washers (2), and slide two bushings (3) away from the cable.

(2) Remove four screws (4) and washers (5), and lift dust cover (6) away from the yoke.

(3) Remove retaining ring (7), and slide the handwheel assembly out through the block. Remove thrust washer (8) and disassemble the handwheel by removing pin (9) and separating handwheel (10) from shaft (11).

(4) Remove two screws (12) and two washers (13), and slide bracket (14) away from engagement shaft assembly (17).

(5) Remove pin (15) and disengage engagement lever (16) from engagement shaft assembly (17). Slide the engagement shaft assembly out through the opening in the azimuth gearbox and remove the engagement shaft assembly.

(6) Remove screw (18), washers (19 and 20), and spring (22), and lift gearbox assembly (23).

(7) Remove screws (24), washers (25), and block (26).

b. Replacement.

(1) Secure block (26) with screws (24) and washers (25).

(2) Secure gearbox assembly (23) and spring (22) to the yoke with screw (18), washers (19 and 20).

(3) Slide engagement shaft assembly (17) through the opening in the gearbox assembly and the yoke and secure lever (16) to the shaft with pin (15).

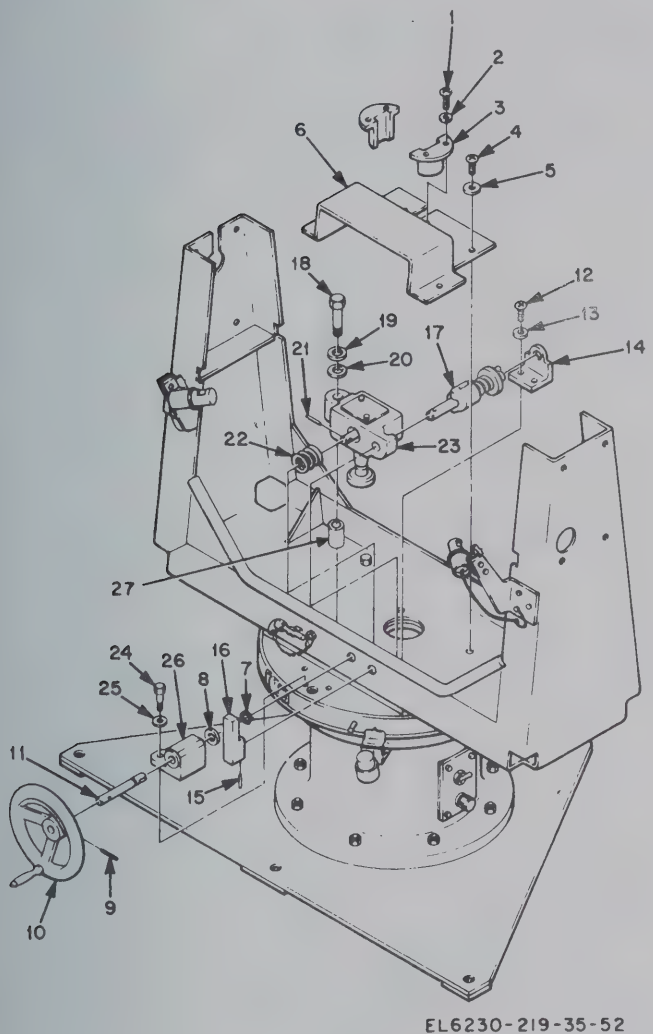
(4) Secure bracket (14) to the yoke with screws (12) and washers (13).

(5) Assemble handwheel (10) to shaft (11) and secure with pin (9).

(6) Slide the handwheel assembly through block (26), thrust washer (8), and secure with retaining ring (7).

(7) Position dust cover (6) over the gearbox and secure with four screws (4) and washers (5).

(8) Secure two bushings (3) around the cable with screws (1) and washers (2).



1 Screw
2 Washer
3 Bushing
4 Screw
5 Washer
6 Dust cover
7 Retaining ring
8 Thrust washer
9 Pin
10 Handwheel
11 Shaft
12 Screw
13 Washer
14 Bracket
15 Pin
16 Lever
17 Engagement shaft assembly
18 Screw
19 Washer
20 Washer
21 Pin
22 Spring
23 Gearbox assembly
24 Screw
25 Washer
26 Block
27 Bronze sleeve bearing

Figure 3—29. Azimuth positioning assembly, exploded view.

3–52. Universal Mount (A) Switch Plate Assembly

(fig. 3—26)

a. Removal.

(1) Remove four screws (20) securing the switch plate assembly to the pedestal.

(2) Tag and remove the wires from the switch and resistor.

b. Replacement.

(1) Solder the wires to the switch and resistor as tagged.

(2) Secure the switch plate assembly to the pedestal with screws (20).

3–53. Universal Mount (A) Yoke Assembly

(fig. 3—26)

NOTE

The azimuth positioning assembly must be removed (para 3—51) before the yoke may be removed.

a. Removal.

(1) Remove bolts (1), nuts (2), and washers (3) securing yoke (4) to the pedestal

(2) Lift yoke (4) away from the pedestal assembly, while guiding the cables through the hole in the yoke.

(3) Remove rubber pad (5) and azimuth scale (6) from the pedestal assembly.

b. Replacement.

(1) Place azimuth scale (6) over the pedestal assembly and position rubber pad (5) on it.

(2) Slide the cables through yoke (4) and position the yoke on the pedestal assembly.

(3) Secure yoke (4) to the pedestal assembly with bolts (1), nuts (2), and washers (3).

3–54. Universal Mount (A) Cable Harness

(fig. 3—26)

NOTES

1. The yoke must be removed (para

3—53) before the cable assembly can be removed.

2. Do not remove the cable assembly unless the cable is to be replaced, as removal requires that the cable be disassembled.

a. Removal.

(1) Remove bolts (7), nuts (8), and washers (9), securing upper race (10) to the pedestal assembly.

(2) Lift upper race (10) off the pedestal assembly.

(3) Remove the eight screws that secure jacks J4 and J5 to the pedestal.

(4) Tag and remove the wires from the jacks, lamps, switch, and fuse.

(5) Remove the cable harness.

b. Replacement.

(1) Solder the wiring harness to the jacks, lamps, switch, and fuse in accordance with the wiring diagram (fig. 2—14 and 6—14).

(2) Secure jacks J4 and J5 to the pedestal with eight screws.

(3) Secure (fig. 3—26) upper race (10) to the pedestal assembly with bolts (7), nuts (8), and washers (9).

3-55. Universal Mount (A) Azimuth Gearbox Assembly

(fig. 3—30)

a. Disassembly.

(1) Remove screws (1), washers (2), cover (3), and gasket (4) from the azimuth gearbox.

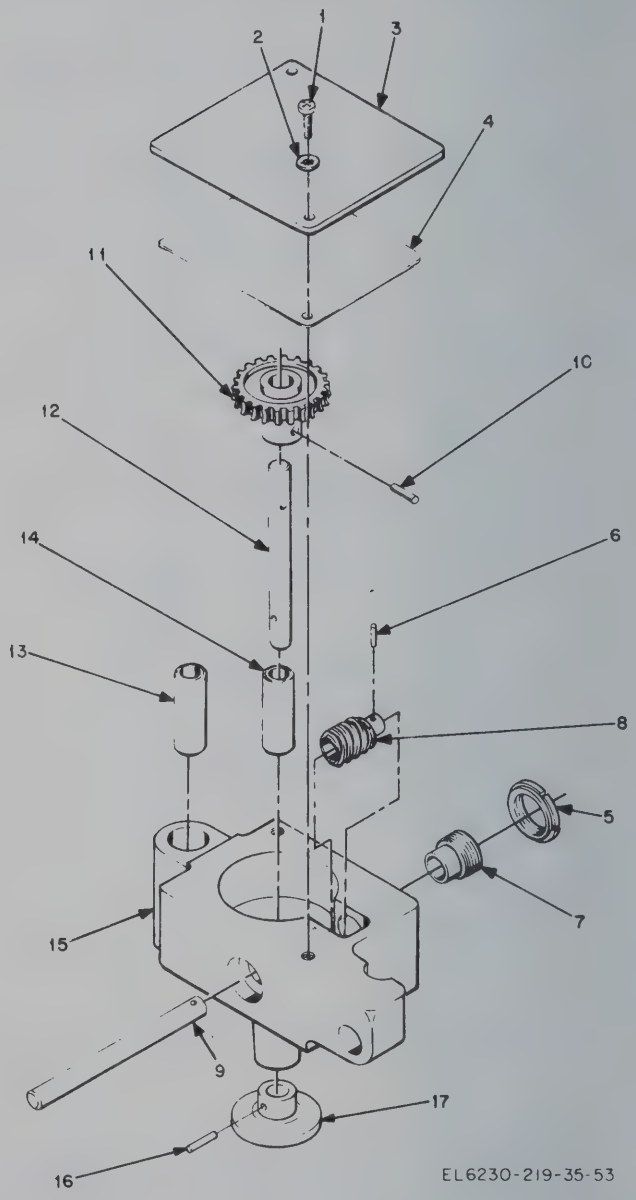
(2) Remove pin (10), modification gear (11), friction shaft (12), and bearing sleeves (13 and 14) from housing block (15).

(3) Clean, inspect, and repair (para 3—20*b*).

b. Reassembly.

(1) Apply retaining compound (MIL—R—46802) to the outside of bearing sleeves (13 and 14) and insert the sleeves in housing block (15). Wipe off excess retaining compound.

(2) Allow the compound 45 minutes to 2 hours for curing.



1 Screw
2 Washer
3 Cover
4 Gasket
5 Bearing lock
6 Pin
7 Shaft control bearing
8 Gear
9 Shaft
10 Pin
11 Modification gear
12 Friction shaft
13 Bearing sleeve
14 Bearing sleeve
15 Housing block
16 Pin
17 Friction drive wheel

Figure 3—30. Azimuth gearbox assembly, exploded view.

(3) Apply a generous coat of grease (MIL—G—23827) to all moving parts.

(4) Position gear (8) in housing block (15) and slide shaft (9) through the gear. Secure with pin (6), shaft control bearing (7), and bearing lock (5).

(5) Secure modification gear (11) to friction shaft (12) with pin (10) and insert the shaft into housing block (15).

(6) Install gasket (4) and cover (3) and secure with screws (1) and washers (2).

3-56. Universal Mount (A) Engagement Shaft Assembly

(fig. 3—31)

a. Disassembly.

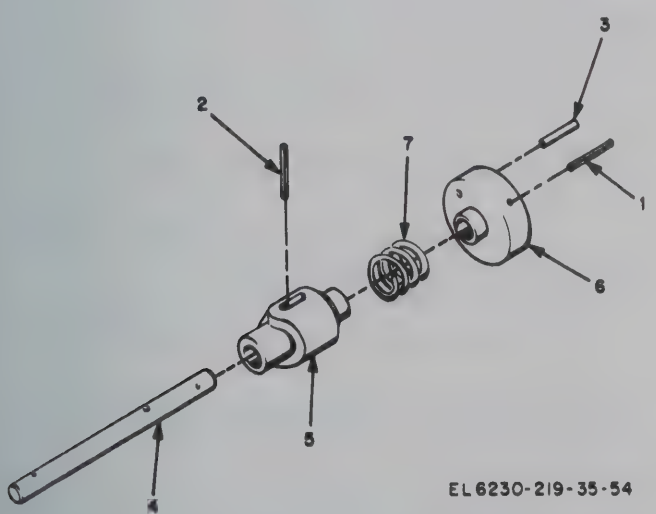
(1) Remove pins (1, 2, and 3) and slide engagement shaft (4) out of cam (5).

(2) Remove bushing (6) and spring (7) from cam (5).

(3) Clean, inspect, and repair (para 3—20*b*).

b. Reassembly.

(1) Slide shaft (4) through cam (5) and secure with pin (2).



1 Pin
2 Pin
3 Pin
4 Engagement shaft
5 Cam
6 Bushing
7 Spring

Figure 3—31. Engagement shaft assembly, exploded view.

(2) Slide spring (7) and bushing (6) onto the shaft and secure with pin (1).

(3) Insert pin (3) into the bushing.

3-57. Universal Mount (A) Pedestal Assembly

(fig. 3—26)

a. Disassembly.

(1) Remove the yoke assembly (para 3—53).

(2) Remove bolts (7), nuts (8), and washers (9) securing upper race (10).

(3) Lift upper race (10), bearing strips (11), gasket (12), and lower race (13) off pedestal (18).

(4) Remove shuttle block (15) from pedestal (18).

(5) Remove screws (16) that secure friction ring (17) to pedestal (18) and remove the friction ring.

(6) Clean, inspect, and repair (para 3—20*b*).

b. Reassembly.

(1) Secure friction ring (17) to pedestal (18) with screws (16).

(2) Position shuttle block (15) on friction ring (17).

(3) Position lower race (13), gasket (12), bearing strips (11), and upper race (10) over the pedestal so that they are supported by the lamp brackets.

(4) Position the items installed in step (3) above so that the bearing strips meet the groove in the pedestal. Secure the items with bolts (7), nuts (8), and washers (9).

3-58. Universal Mount (A) Level Assembly

(fig. 3—32)

a. Disassembly.

(1) Remove screws (1) securing levels (2).

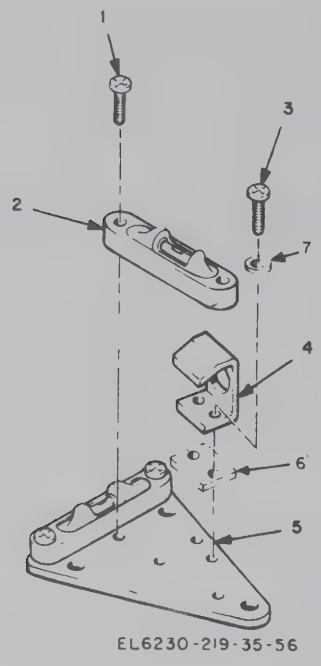
(2) Remove screws (3) securing level lamp (4) to plate (5).

(3) Clean, inspect, and repair (para 3—20*b*).

b. Reassembly.

(1) Secure level lamp (4) to plate (5) with screws (3).

(2) Secure levels (2) to plate (5) with screws (1).



1 Screw
2 Level
3 Screw
4 Light bracket
5 Plate
6 Spacer
7 Flatwasher

Figure 3—32. Level assembly, exploded view.

3-59. Universal Mount (A) Scope Mount
(fig. 3—33)

a. Disassembly.

(1) Remove pin (1), thumbscrew (2), clamp (3), and spring (4).

(2) Remove lug (5), washer (7), nut (6), and pedestal (8).

(3) Remove nut (9), lockwashers (10) and rods (11) from bracket (12) and the bar bracket assembly.

(4) Remove screws (13), washers (14), and adjusting bracket (15) from bar slide (16).

(5) Clean, inspect, and repair (para 3—20*b*).

b. Reassembly.

(1) Assemble adjusting bracket (15) clamp (3), and spring (4); and secure to pedestal (8) with retaining compound (MIL—R—46802).

(2) Screw lugs (5) to pedestal (8) with nut (6) and washer (7).

(3) Secure adjusting bracket (15) and pedestal (8) to bar slide (16) with screws (13), washers (14) and pin (1).

(4) Slide rods (11) through the holes in bracket (12) and bar slide (16) and secure with nuts (9) and washers (10).

(5) Install thumbscrew (2).

3-60. Shockmount Assembly
(fig. 3—34)

a. Disassembly.

(1) Remove nut (20), washer (21), screw (28), lockwasher (27), and washer (21).

(2) Remove cap (26) and remove the shockmount assembly from the searchlight.

(3) Remove ring (22), seal (23), ring (24), and bearing (25) from rod (1).

(4) Remove rod (1) from bracket (2).

(5) Remove pin (31) from pin (29).

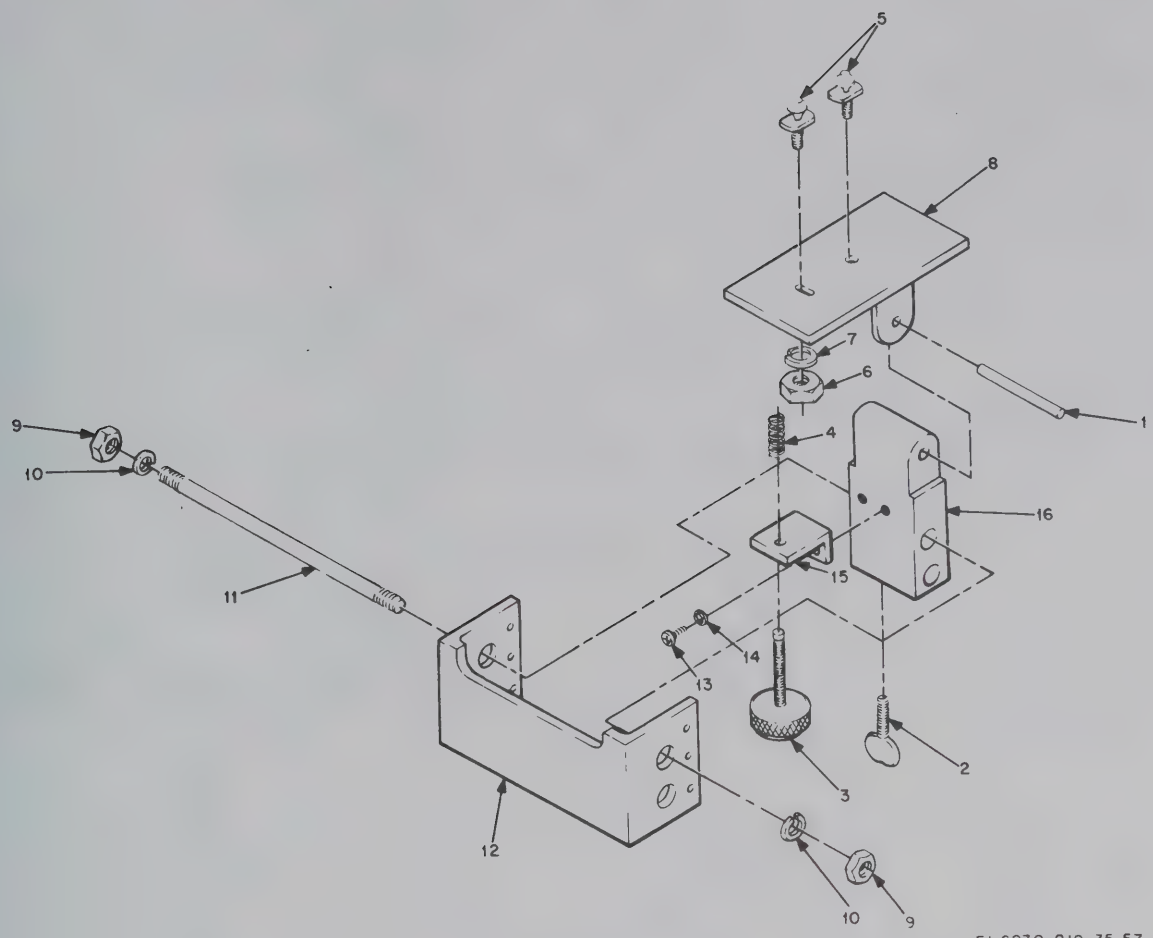
(6) Remove nut (11), washer (5), bolt (6), and washer (30) from bracket (2).

(7) Remove socket (12) from bracket (2).

(8) Remove nut (11) and washer (4) from screw (3).

(9) Remove pin (8) from pin (10) and remove handle (9), plate (7), spring (15), lock (16), shaft (17), and spring (18) from socket (12).

(10) Remove bolt (6), washer (5), and washer (4) from bracket (2).



1 Pin	5 Lug	9 Nut	13 Screw
2 Thumbscrew	6 Nut	10 Lockwasher	14 Washer
3 Clamp	7 Washer	11 Rod	15 Adjusting bracket
4 Spring	8 Pedestal	12 Bracket	16 Bar slide

Figure 3—33. Scope mount assembly, exploded view.

(11) Remove pin (8) from pin (10) and remove handle plate (7), spring (15), lock (16), pin (14), shaft (17), and spring (18) from socket (19).

(12) Clean, inspect, and repair (para 3—20*b*).

b. Reassembly.

(1) Replace spring (18), shafts (17), and pins (14) in locks (16).

(2) Replace springs (15) on shaft (17) and place shaft (17) through the slot in socket (19).

(3) Replace plates (7) and handles (9) over shaft (17).

(4) Secure handles (9) to shaft (17) with pins (10 and 8).

(5) Secure socket (19) to bracket (2) with bolt (6), washer (5), and washer (4).

(6) Replace spring (18), shaft (17), and pin (14) in lock (16).

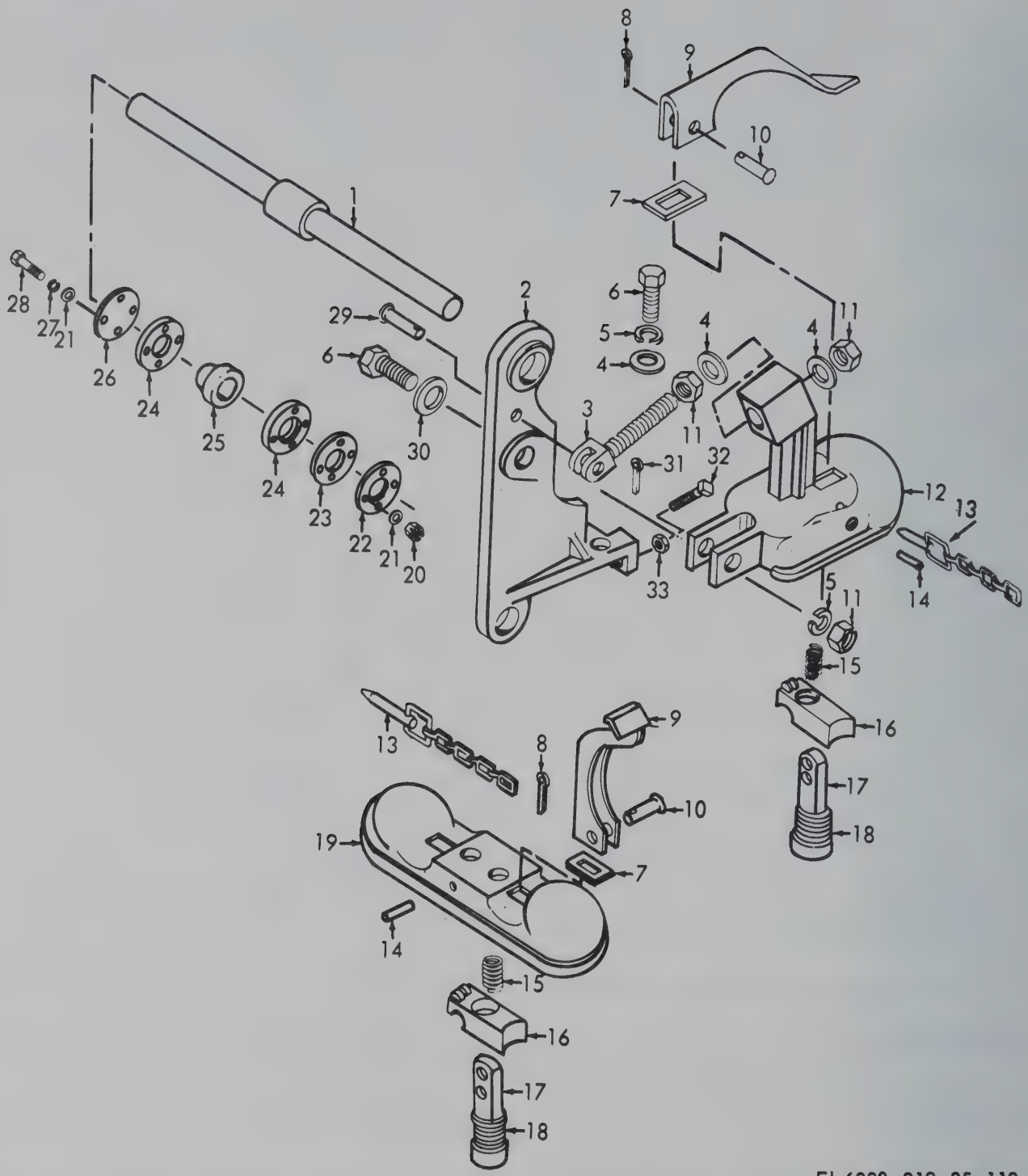
(7) Replace spring (15) on shaft (17) and place shaft (17) through the slot in socket (12).

(8) Replace plate (7) and handle (9) over shaft (17).

(9) Secure handle (9) to shaft (17) with pins (10 and 8).

(10) Replace screw (3) through socket (12) and secure with washer (4) and nut (11).

(11) Attach socket (12) to bracket (2) and secure with nut (11), washers (5 and 30), and bolt (6).



1 Rod 2A3MP2	9 Handle 2A1MP2	17 Shaft 2A1A1	25 Bearing MP7
2 Bracket 2A3MP1	10 Pin 2A1H2	18 Spring 2A1A1MP1	26 Cap MP2
3 Screw 2A1MP6	11 Nut	19 Socket 2A2MP7	27 Lockwasher
4 Washer	12 Socket 2A1MP8	20 Nut	28 Screw
5 Washer 2H2	13 Pin 2A1MP1	21 Washer	29 Pin
6 Bolt	14 Pin 2A1MP3	22 Ring MP5	30 Washer
7 Plate 2A1MP7	15 Spring 2A1MP4	23 Seal MP4	31 Pin
8 Pin 2A1H1	16 Lock 2A1MP5	24 Ring MP3	32 Setscrew 2H5
			33 Nut 2H6

Figure 3—34. Shockmount assembly.

(12) Secure screw (3) to bracket (2) with pins (29 and 31).

(13) Replace rod (1) through bracket (2).

(14) Replace ring (22), seal (23), ring (24), bearing (25), and ring (24).

(15) Attach the shockmount to the searchlight with cap (26), screw (28), lockwasher (27), washer (21), and nut (20).

Section V. DIRECT SUPPORT TESTING PROCEDURES

3-61. General

This section covers testing procedures to be used by direct support maintenance personnel to determine whether repaired equipment is performing satisfactorily for return to users. The performance standards provide a direct go-no-go basis on which the tester can reject or pass the repaired equipment.

3-62. Operational and Physical Inspection Test

a. Test Equipment and Materials. Refer to paragraph 3-2.

b. Test Connections and Conditions. The searchlight must be completely interconnected to perform this test.

c. Procedure.

Step No.	*Control settings*		*Test procedure*	*Performance standard*
	Test equipment	*Equipment under test*		
1	Not applicable (NA)	SEARCHLIGHT power: OFF	*a.* Inspect blower inlet and outlet screens.	*a.* Blower inlet and outlet screens must be free of obstructions.
		Main power: OFF	*b.* Set main power switch to ON.	*b.* None.
		Mode SELECTOR SWITCH: BO	*c.* Pull upward on the SEARCHLIGHT power switch and place it at STAND-BY.	*c.* The blower motor must operate. The searchlight must not emit light. *Warnings.* 1. Do not operate the searchlight if the blow motor does not operate. 2. Do not look directly into the searchlight beam. Serious eye damage may result.
			d. Set the mode SELECTOR SWITCH to VIS WIDE. Observe IR filter drive motor B3. *Caution.* Place the SEARCHLIGHT power switch to OFF if the searchlight remains in the overdrive mode of operation over 20 seconds. Do not operate the searchlight in overdrive more than once in any 5-minute period of operation.	*d.* IR filter drive motor B3 must rotate clockwise and position the IR filter in rear of the xenon lamp. The searchlight must emit a wide beam of visible light.
			e. Pull the mode SELECTOR SWITCH control knob upward and release it immediately.	*e.* The indicator lamp on the control box must illuminate and the intensity of the xenon

Step No.	Test equipment	Control settings / Equipment under test	Test procedure	Performance standard
				lamp must increase. After 15 to 20 seconds have elapsed, the overdrive mode must automatically cut off, the indicator lamp must go out, and the intensity of the xenon lamp must return to normal.
			f. Set the mode SELECTOR SWITCH to IR WIDE. Observe refractor lens drive motor B1.	*f.* Refractor lens drive motor B1 must rotate counterclockwise and move the refractor lens to the rear of the xenon lamp.
			g. Set the mode SELECTOR SWITCH to IR FOCUS, IR WIDE, BO, VIS WIDE, and VIS FOCUS in turn.	*g.* The searchlight must not emit visible light in the BO and IR modes. Shadows must not be cast on the primary reflector.
			h. Set the mode SELECTOR SWITCH to BO. Pull upward on the SEARCHLIGHT power switch and set it to STANDBY.	*h.* Xenon lamp must remain illuminated but blacked out.
			i. Pull upward on the SEARCHLIGHT power switch and set it to OFF. *Warning.* To prevent xenon lamp explosion and possible injury to personnel and equipment, wait until the blower motor stops before continuing to the next item.	*i.* The blower motor must continue to operate if the searchlight has been operational for over 3 minutes.
			j. After the blower motor stops, set the main power switch to OFF.	*j.* None.
2	NA	Controls may be in any position.	*a.* Inspect cover assembly for tears, damaged buckles, dirt, and proper fit with cowling assembly.	*a.* Cover assembly must not have any tears. Buckles must not be damaged. Cover must fit snug on cowling assembly.
			b. Check nameplates on searchlight housing assembly.	*b.* Nameplates must be legible.
			c. Check latches on searchlight housing assembly.	*c.* Latches must close properly.
			d. Inspect heat exchanger assembly air ducts.	*d.* Air ducts must be free of dirt.
			e. Remove cowling assembly and check inner gasket and outer ring.	*e.* Inner gasket and outer ring must make a secure and watertight seal.

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedure	Performance standard
			f. Inspect cowling glass.	*f.* Glass must be clean and not chipped or cracked.
			g. Inspect cowling assembly latches.	*g.* Latches must close properly.
			h. Inspect primary reflector.	*h.* Primary reflector must be free of pits and scratches. It must be clean.
			i. Inspect lamp housing assembly.	*i.* Lamp housing assembly must not have cracked or broken lens or corrosion.
			j. Inspect cable assemblies.	*j.* Cable assemblies must not be corroded, have stripped threads, damaged insulation, or broken strands. Cables must properly fit receptacles.
			k. Check DA Pam 310–7 to determine whether new applicable MWO's have been published.	*k.* All URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled.
			l. Inspect all controls and mechanical assemblies for loose or missing screws, bolts, or nuts.	*l.* Screws, bolts, and nuts will be tight, none missing.
			m. Inspect all connectors, sockets, and receptacles for looseness and damage.	*m.* No looseness or damage evident.
			n. Operate all controls on control box, control panel, and/or junction box.	*n.* Controls rotate or operate freely without binding or excessive looseness.
			o. Inspect searchlight for condition of finish and panel markings. *Note.* Touchup painting is recommended in lieu of refinishing whenever practicable. Screw heads, binding posts, receptacles, and plated fastener parts will not be painted or polished with abrasives.	*o.* External surfaces intended to be painted will not show bare metal. Panel lettering will be legible.

3–63. Mount, Universal MT–3900/GSS–14 Test

a. Test Equipment and Materials. No special test equipment or materials are required for this test.

b. Test Connections and Conditions. The universal mount can be tested only with a searchlight installed or a dummy weight in place of the searchlight. Set the azimuth and elevation brakes and proceed as follows:

c. Procedure.

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedure	Performance standards
1	NA	Release elevation brakes.	Adjust elevation handwheel.	The searchlight must be adjustable from −700 to

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedure	Performance standard
				+1400 mils. The mount must operate without binding or jerking.
2	NA	Set the elevation brakes.	Try to adjust the elevation handwheel.	The searchlight cannot be adjusted in elevation.
3	NA	Release the azimuth brake.	Move the searchlight in azimuth.	The searchlight must move through 6,500 mils in azimuth without binding.
4	NA	Set the azimuth brake.	Try to move the searchlight in azimuth.	The searchlight must not move in azimuth.

3-64. Mount, Searchlight MT-3900A/GSS-14 Test

(fig. 3-33)

a. Test Equipment and Materials. No special test equipment or materials are required for this test.

b. Test Connections and Conditions.

(1) Install an operational searchlight in the universal mount (A) (para 3-48*b*(15)).

(2) Connect the power cable to jack J4 of the universal mount (A).

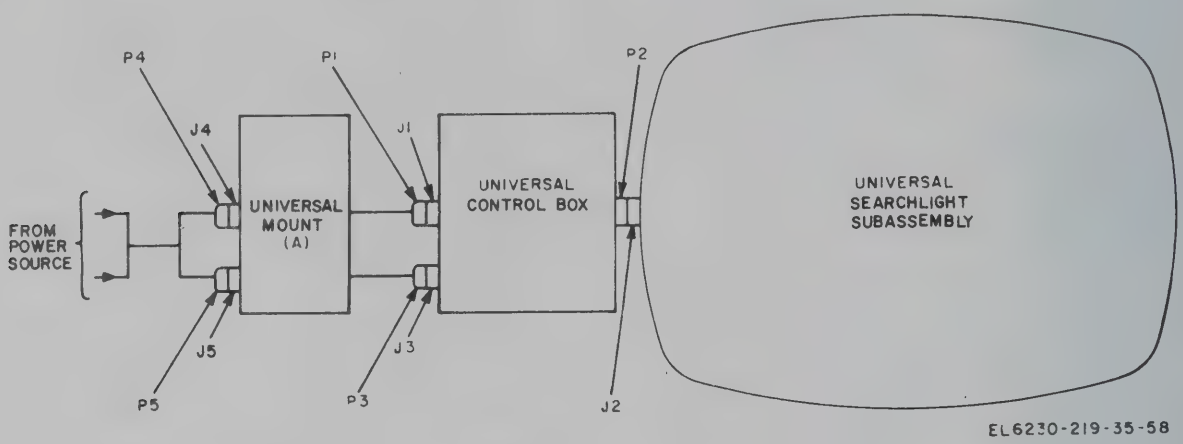


Figure 3-35. Mount, Searchlight MT-3900A/GSS-14 test setup diagram.

c. Procedure.

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedure	Performance standard
1	NA	NA	*Warning.* Do not look directly into the searchlight while it is on. Temporary blindness may result.	
			Turn on searchlight.	The searchlight operates.
2	NA	Set the scale illumination switch to on.	Turn off the searchlight.	The azimuth and elevation scale illumination lamps must light.
3	NA	Set elevation brake handwheel to off.	Adjust elevation handwheel.	The searchlight must be adjustable from -700 to +1400 mils.
4	NA	Set the elevation brake. *Note.* Remove the azimuth lock pin if it is engaged.	Try to adjust the elevation handwheel.	The searchlight shall not be adjustable in elevation.

Step No.	Control settings: Test equipment	Control settings: Equipment under test	Test procedure	Performance standard
5	NA	Place the azimuth engagement lever in the horizontal position.	Turn the azimuth handwheel.	The searchlight must be adjustable through 6,500 mils in azimuth.
6	NA	Place the azimuth engagement lever in the vertical position.	Turn the azimuth handwheel.	The searchlight must not change azimuth.
7	NA	NA	Use the handle to position the searchlight.	The searchlight must be movable through 6,500 mils in azimuth.

CHAPTER 4

GENERAL SUPPORT MAINTENANCE

Section I. GENERAL

4–1. Scope

General support maintenance procedures supplement direct support maintenance procedures (chap 3). Refer to TM 11—6625—1580—12 for troubleshooting and testing procedures utilizing Test Set, Searchlight AN/GSM—182.

4–2. Tools, Test Equipment, and Materials Required

The general support maintenance echelon requires the same items as direct support maintenance (para 3—2) plus the following additional items:

a. Pencil-type soldering iron, 25-watts

b. Small twist drills No. 30 through No. 60

c. Pin vise

d. Small metal pick

e. One-half inch brush

f. Rosin-alcohol solder flux, MIL—14256 (Sig C)

g. Varnish, MIL—V—173A

h. Alcohol

4–3. Overhaul Responsibilities

General support maintenance is responsible for overhaul of the following components:

a. Searchlight housing assembly

b. Lamp housing assembly

c. Lamp drive assembly

d. Heat exchanger assembly

e. Blower assembly

f. Converter assembly

g. Relay panel assembly

h. Control box assembly

Section II. GENERAL SUPPORT TROUBLESHOOTING

4–4. General

General support troubleshooting procedures utilizing Test Set, Searchlight AN/GSM—182 are outlined in TM 11—6625—1580—12. This section prescribes isolating procedures for troubles after they have been localized on the AN/GSM—182.

4–5. Relay Panel Assembly (Varo Model 9913)

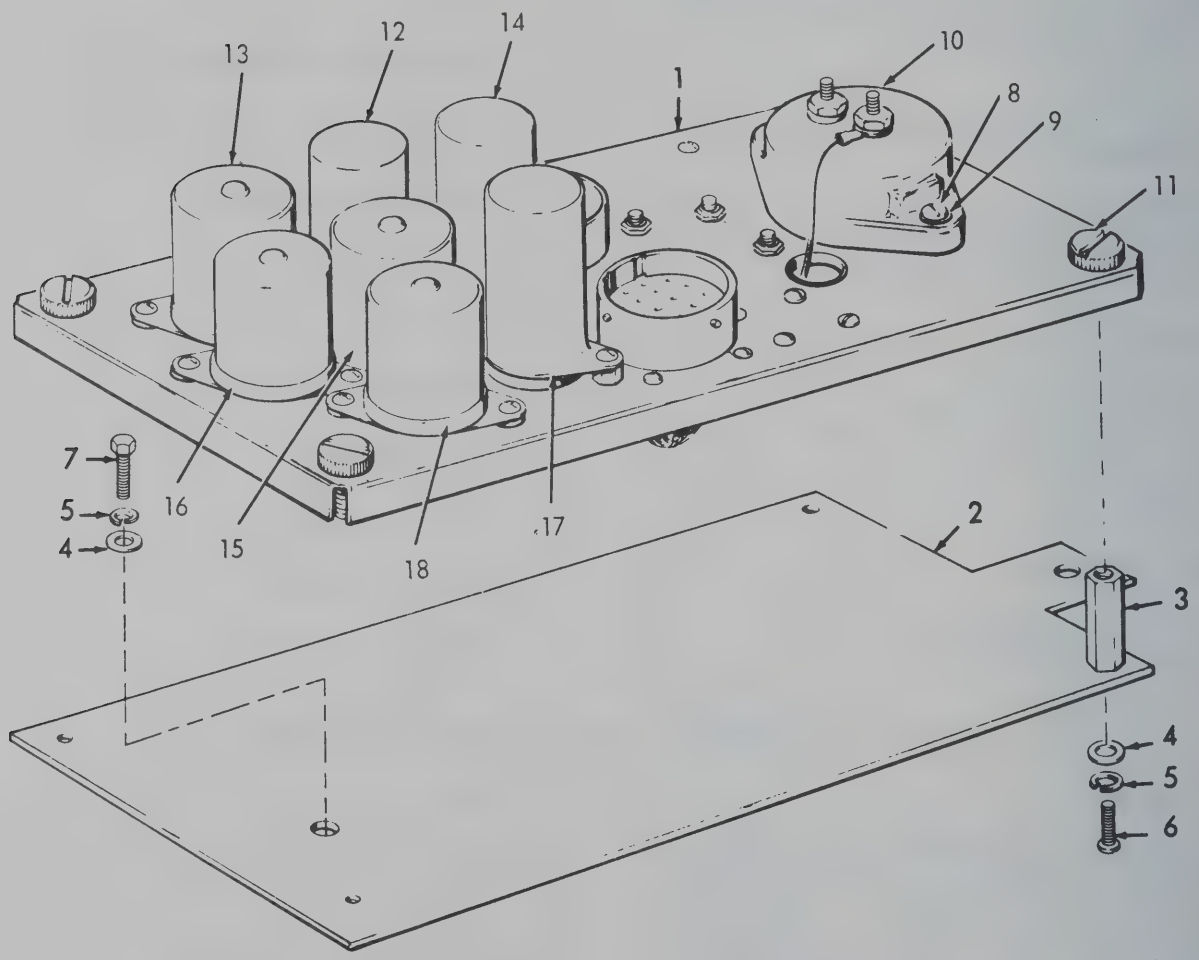
a. General. The early searchlight (AN/VSS—1) uses a model 9913 relay panel with plug-in relays. The relays, including K3 (overdrive time-delay circuit) and K13 (3-second shutdown circuit) are unrepairable and are discarded when they become defective. Figures 2—8, 2—9, and 6—3 show schematic diagrams of the relay panel. Figure 4—1 shows parts location. Use the illustrations when troubleshooting the relay panel.

b. Procedure. To determine whether relays are defective, perform the individual relay tests (TM 11—6625—1580—12). If no AN/GSM—182 is available, proceed as follows.

(1) Using an ohmmeter, make the following measurements:

Check for	Measure From	Measure To	Good indication (ohms ±5%)	If failed, possible remedy
Open K9	Pin C, J6	Terminal 11, K9	2.5	Replace K9.
Open K8	Pin B, J6	Terminal 11, K8	2.5	Replace K8.
Open K7	Pin A, J6	Terminal 11, K7	2.5	Replace K7.
Open wire	Pin L, J6	Pin J, J4	0	Replace wire.
Open CB1	Terminal 1, CB1	Terminal 2, CB1	0[a]	Replace CB1.
Open CB2	Terminal 1, CB2	Terminal 2, CB2	0[a]	Replace CB2.
Open CB3	Terminal 1, CB3	Terminal 2, CB3	0[a]	Replace CB3.
Open CB4	Terminal 1, CB4	Terminal 2, CB4	0[a]	Replace CB4.
Open K12	Terminal 4, K12	Terminal 11, K12	2.5	Replace K12.
Open wire	Pin J, J6	Terminal 2, K12	0	Replace wire.
Open wire	Pin E, J6	Pin D, J6	0	Replace wire.
Open wire	Pin G, J6	Pin L, J6	0	Replace wire.

[a]Circuit breaker in closed position.



1 Panel assembly	4 Washer	7 Screw	10 Circuit breaker	13 Relay K8	16 Relay K9
2 Cover	5 Washer	8 Screw	11 Screw	14 Relay K13	17 Relay K3
3 Spacer	6 Screw	9 Washer	12 Relay K7	15 Relay K12	18 Relay K1

Figure 4—1. Relay panel assembly (Varo model 9913), exploded view.

(2) Check CR1 in the blower motor relay circuit. Place the black lead (negative) on the anode of CR1 and connect the red lead (positive) on the cathode of CR1. Using the RX1 scale, the meter should indicate an open circuit. Reverse the meter leads. The meter should indicate approximately 11 ohms. Replace defective CR1.

(3) Check CR7 (relay panel assembly) in the same manner described in (2) above.

(4) Disconnect one end of R10. Measure the resistance of R10. Resistance should be 10 kilohms ±20 percent. Replace defective resistor.

(5) Disconnect one end of C18. Use ohmmeter on RX10K scale. Meter should read 0 ohm initially and increase in resistance slowly. If this charging indication is not observed, replace C18.

(6) Check C19 in the same manner described in (5) above.

(7) If above actions do not correct the trouble, refer the relay panel to depot for repair. Be sure the original relays are in the panel when forwarded to the depot.

4-6. Relay Panel Assembly (Varo Model 9922)

a. General. This assembly contains a printed circuit board. Repairs will be made as outlined in section III of this chapter. Figures 2—10, 2—11, and 6—4 through 6—9 show schematic diagrams of the relay panel. Figure 4—2 shows parts location and figure 4—3 shows the printed circuit configuration. Figure 4—4 shows the semiconductor configurations. Use these illustrations when troubleshooting the relay panel.

NOTE

The Varo model 9922 and Melpar model F40015 assemblies are almost identical. In some cases, reference designators are not the same.

b. Procedure.

(1) Remove the drive pins from the relay panel cover and pull out the printed circuit board.

(2) Make the measurements and take the corrective actions listed in the charts below. If symptom persists, refer defective relay panel to depot for repair.

(a) Relay panel assembly (Varo model 9922) 3-second shutdown circuit measurements.

Check for	*Meter (+) to*	*Meter (-) to*	*Scale*	*Good indication (ohms ± 5%)*	*If failed, possible remedy*
Open R4	Cathode Q2	Junction R4, R6	RX1	100	Replace R4.
Short Q2	Anode Q2	Cathode Q2	RX1	Infinity	Replace Q2.
Open C1 (disconnect one end)	C1+	C1−	RX10K	Charging	Replace C1.
Short Q1	Q1—B2	Q1—B1	RX1	Infinity	Replace Q1.
Open CR8	Anode CR8	Cathode CR8	RX1	11	Replace CR8.
Open Q3	Q3—E	Q3—B	RX1	11	Replace Q3.
Short Q3	Q3—B	Q3—E	RX1	Infinity	Replace Q3.
	Q3—C	Q3—B	RX1	11	Replace Q3.
	Q3—B	Q3—C	RX1	Infinity	Replace Q3.
	Q3—C	Q3—E	RX1	Infinity	Replace Q3.
	Q3—E	Q3—C	RX1	Infinity	Replace Q3.
Open R6	Junction R6, R7	Cathode Q2	RX100	560	Replace R6.

(b) Relay panel assembly (Varo model 9922) overdrive time-delay circuit measurement.

Check for	*Meter (+) to*	*Meter (-) to*	*Scale*	*Good indication (ohms ±5%)*	*If failed, possible remedy*
Short C3	C3+	C3-	RX10K	Charging	Replace C3.
Open Q6	Q6—B	Q6—E	RX1	11	Replace Q6.

Check for	Meter (+) to	Meter (-) to	Scale	Good indication (ohms ±5%)	If failed, possible remedy
Open Q6	Q6—E	Q6—B	RX1	Over 500	Replace Q6.
Open K1	Q6—E	Cathode Q5	RX100	600	Replace K1.
Short Q5	Cathode Q5	Anode Q5	RX1	Infinity	Replace Q5.
Short Q4	Q4—B2	Q4—B1	RX1	Over 500	Replace Q4.
Open C3	C3+	C3-	RX10K	Charging	Replace C3.
Short Q6	Q6—C	Q6—E	RX1	Infinity	Replace Q6.

4-7. Relay Panel Assembly (Melpar Model F40015)

a. This assembly contains a printed circuit board. Repairs will be made as outlined in Section III of this chapter. Figures 2—10, 2—11, and 6—4 show schematic diagrams of the relay panel. Figure 4—2 shows parts location and figure 4—3 shows the printed circuit configuration. Figure 4—4 shows semiconductor configurations. Use these illustrations when troubleshooting the relay panel.

NOTE

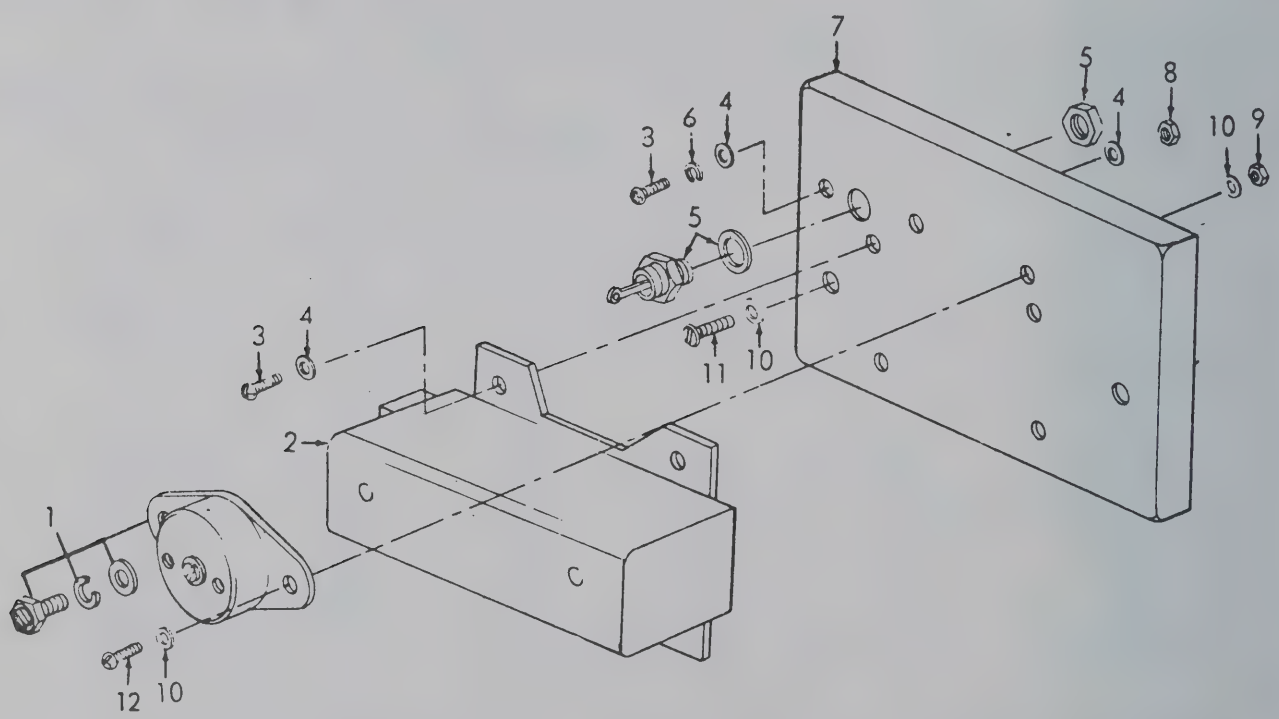
The Varo model 9922 and Melpar model F40015 assemblies are almost identical. In some cases, reference designations are not the same.

b. Procedure.

(1) Remove the drive pins from the relay panel cover and pull out the printed circuit board.

(2) Make the measurements and take the corrective actions listed in the charts below. If symptom persists, refer relay panel to depot for repair.

(a) Relay panel assembly (Melpar model F40015) 3-second shutdown circuit measurements.



1 Circuit breaker
2 Relay assembly
3 Screw
4 Washer
5 Diode
6 Washer
7 Cover
8 Nut
9 Nut
10 Washer
11 Screw
12 Screw

Figure 4—2. Relay panel assembly (Varo model 9922 and Melpar model F40015), exploded view.

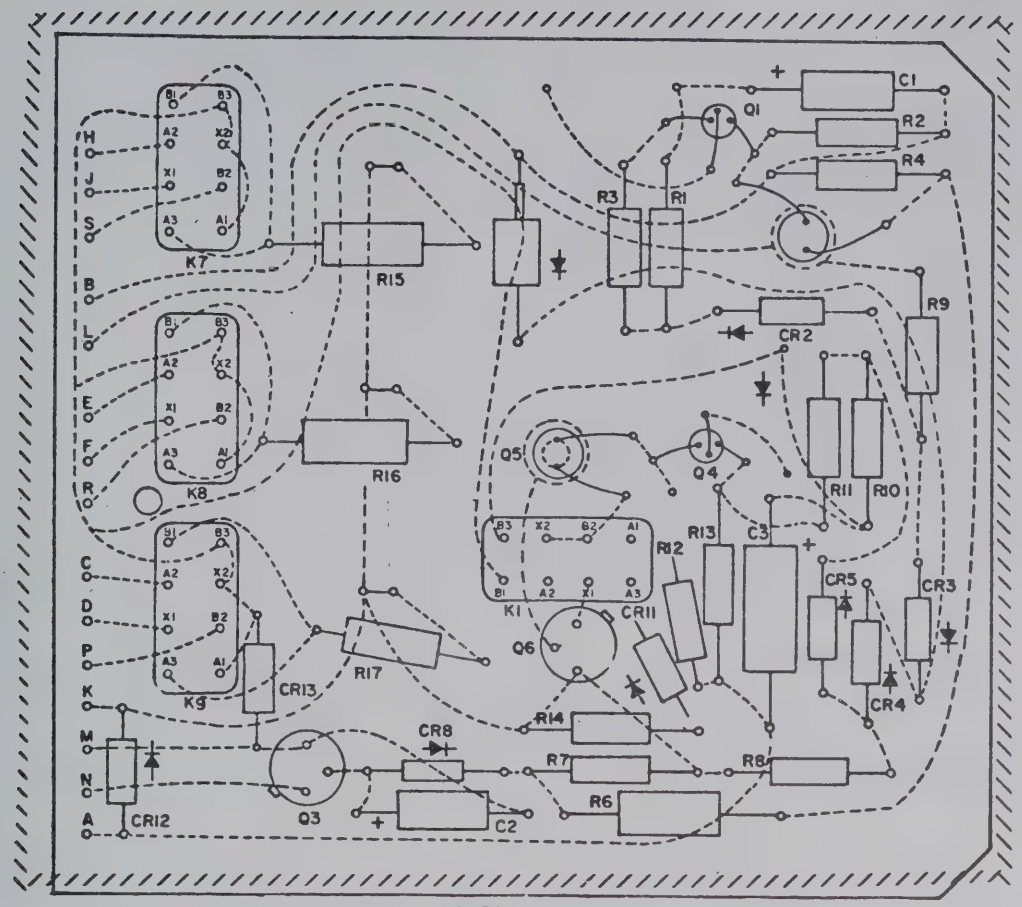


Figure 4—3. Relay panel assembly (Varo model 9922 and Melpar model F40015) printed circuit board.

Check for	*Meter (+) to*	*Meter (-) to*	*Scale*	*Good indication (ohms ±5%)*	*If failed, possible remedy*
Open R4	Cathode Q2	Junction R4, R3	RX1	100	Replace R4.
Short Q2	Anode Q2	Cathode Q2	RX1	Infinity	Replace Q2.
Open C1	C1+	C1-	RX10K	Charging	Replace C1.
Short Q1	Q1—B2	Q1—B1	RX1	Infinity	Replace Q1.
Open CR3	Anode CR3	Cathode CR3	RX1	11	Replace CR3.
Open Q3	Q3—E	Q3—B	RX1	11	Replace Q3.
Short Q3	Q3—B	Q3—E	RX1	Infinity	Replace Q3.
	Q3—C	Q3—B	RX1	11	Replace Q3.
	Q3—B	Q3—C	RX1	Infinity	Replace Q3.
	Q3—C	Q3—E	RX1	Infinity	Replace Q3.
	Q3—E	Q3—C	RX1	Infinity	Replace Q3.
Open R6	Junction R7 R6	Cathode Q2	RX100	560	Replace R12.

(b) Relay panel assembly (Melpar model F40015) overdrive time-delay circuit measurement.

Check for	*Meter (+) to*	*Meter (-) to*	*Scale*	*Good indication (ohms ±5%)*	*If failed, possible remedy*
Short C4	C4+	C4-	RX10K	Charging	Replace C4.
Short Q3	Q3—E	Q3—C	RX1	Infinity	Replace Q3.

Check for	Meter (+) to	Meter (-) to	Scale	Good indication (ohms ±5%)	If failed, possible remedy
Open CR5	Anode CR5	Cathode CR5	RX1	11	Replace CR5.
Open CR5	Cathode CR5	Anode CR5	RX1	Over 500	Replace CR5.
Open K4	Cathode CR5	Cathode Q5	RX100	600	Replace K4.
Short Q5	Cathode Q5	Anode Q5	RX1	Infinity	Replace Q5.
Short Q4	Q4—B2	Q4—B1	RX1	Over 500	Replace Q4.
Open C2	C2+	C2-	RX10K	Charging	Replace C2.
Open C3	C3+	C3-	RX10K	Charging	Replace C3.

4-8. Converter Assembly (Varo Model 9912 and Melpar Model F5001)

a. General. The Varo model 9912 and Melpar model F50001 are electrically the same. This procedure is used for both models. Figures 2—3, 6—3, and 6—4 show schematic diagrams of the converter. Figures 4—5 and 4—6 show parts loca-

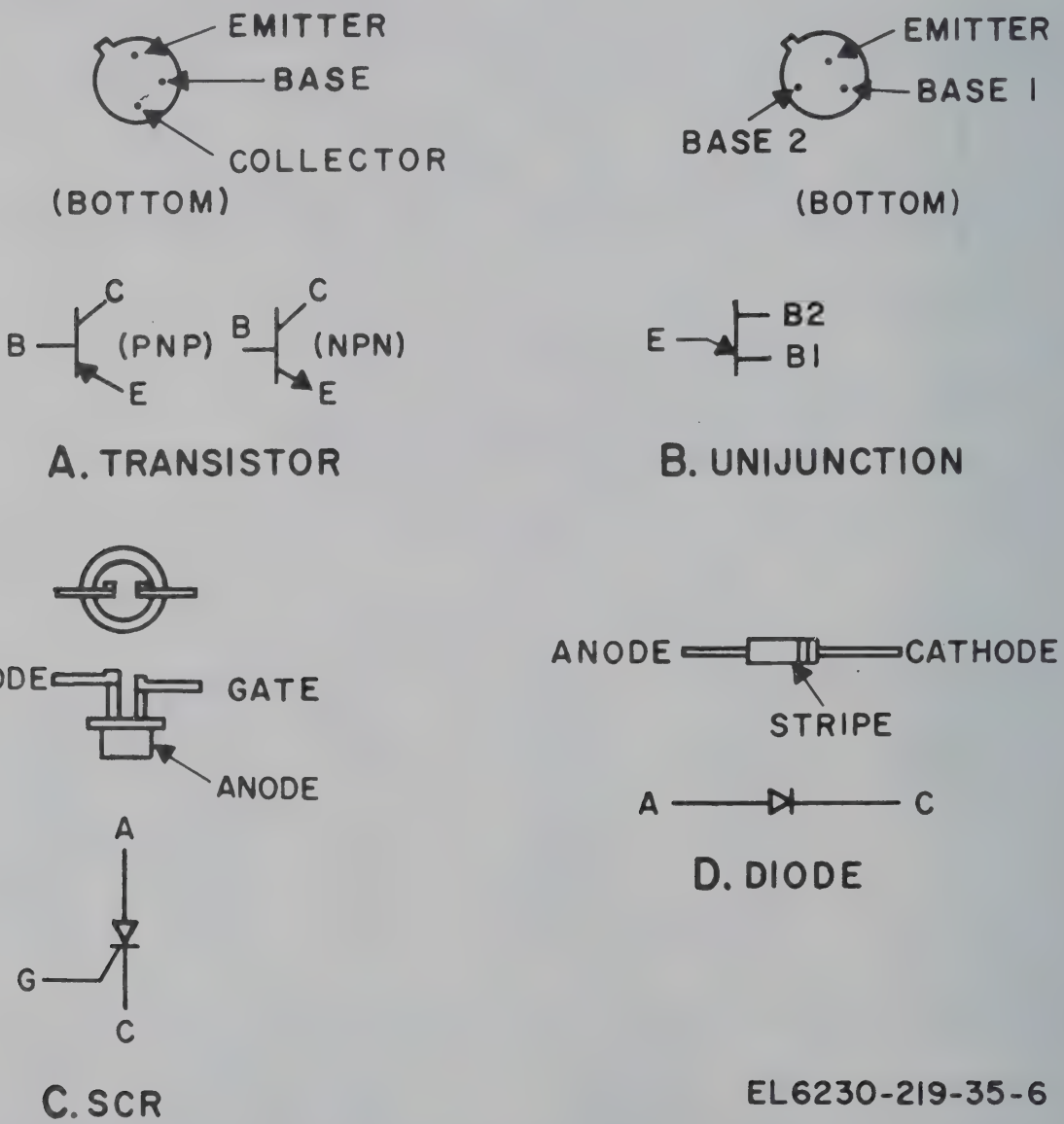


Figure 4—4. Semiconductor configurations.

tion. Refer to figure 4—4 for semiconductor configurations. Refer to these illustrations when troubleshooting. Repairs are made to printed circuit boards as prescribed in section III of this chapter. The printed circuit board is shown in figure 4—7.

b. Procedure.

(1) Make a visual inspection of the converter. Repair obvious defects.

(2) Using an ohmmeter, make the measurements and take corrective actions listed in the chart below. If trouble persists, refer the converter to depot for repair.

Check for	*Meter (+) to*	*Meter (-) to*	*Scale*	*Good indication (ohms ±5%)*	*If failed, possible remedy*
Open or short CR3	Anode CR3	Cathode CR3	RX1	10	Replace CR3.
	Cathode CR3	Anode CR3	RX1	Infinity	Replace CR3.
Open or short CR4	Anode CR4	Cathode CR4	RX1	10	Replace CR4.
	Cathode CR4	Anode CR4	RX1	Infinity	Replace CR4.
Short SCRQ1	Anode Q1	Cathode Q1	RX1	8	Replace Q1.
	Cathode Q1	Anode Q1	RX1	Infinity	Replace Q1.
Short SCRQ2	Anode Q2	Cathode Q2	RX1	8	Replace Q2.
	Cathode Q2	Anode Q2	RX1	Infinity	Replace Q2.
Short C1	C1—1 (disconnect one end)	C1—2	RX10K	Charging	Replace C1.
Short or open CR1	Cathode CR1	Anode CR1	RX1	Infinity	Replace CR1.
	Anode CR1	Cathode CR1	RX1	11	Replace CR1.
Short or open CR2	Cathode CR2	Anode CR2	RX1	Infinity	Replace CR2.
	Anode CR2	Cathode CR2	RX1	11	Replace CR2.
Open or short C2	TB1—3	TB1—4	RX10K	Charging	Replace C2.

4–9. Converter Assembly (Varo Model 9924)

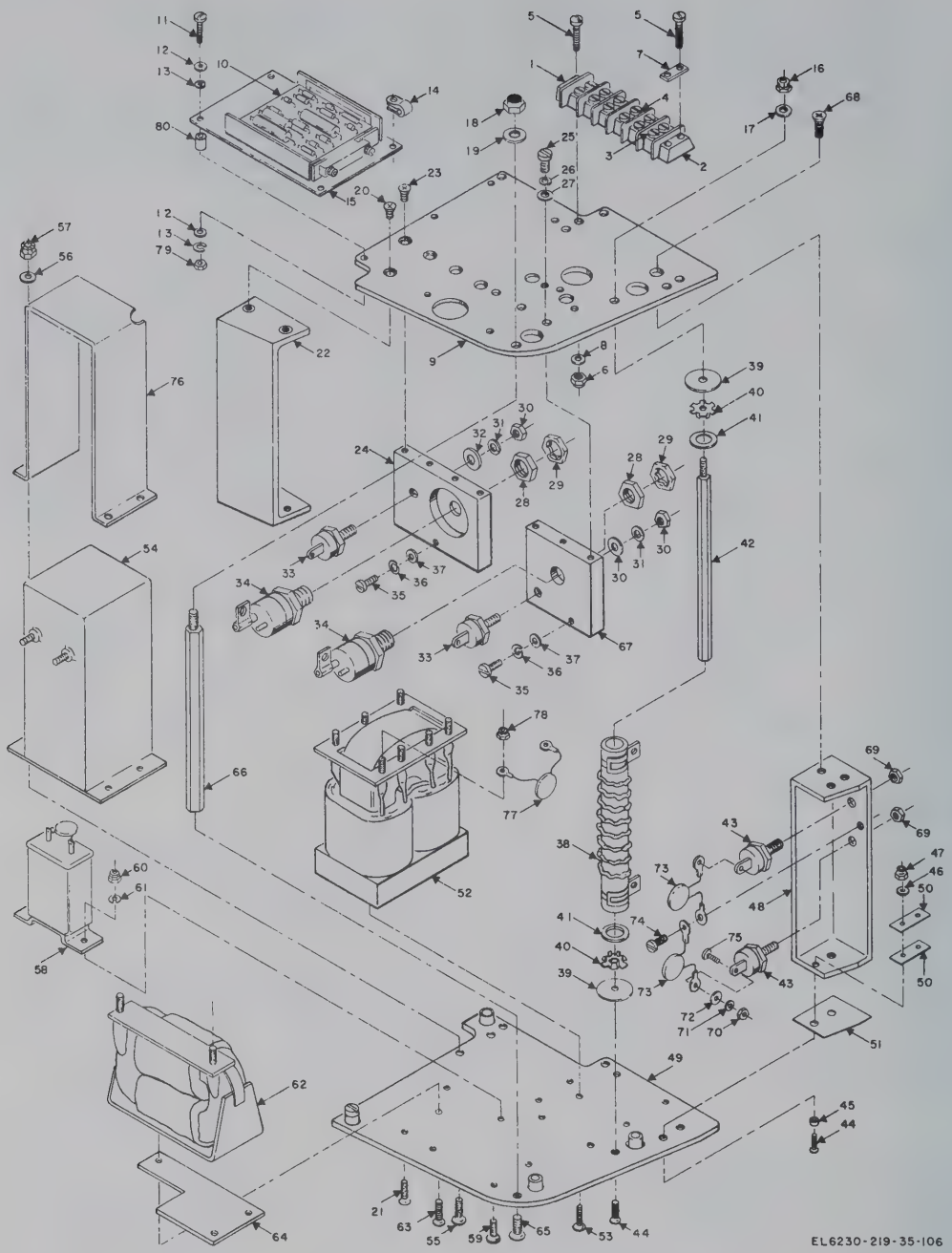
a. General. Using the following procedure, the cause of failure can be found in a minimum of time. Figures 2—5 and 6—5 show schematic diagrams of the converter. Figure 4—8 shows parts location. Semiconductor configurations are shown in figure 4—8. Refer to these illustrations when troubleshooting. The printed circuit board is the same as that shown in figure 4—7.

b. Procedure.

(1) Make a visual inspection of the converter. Repair obvious defects.

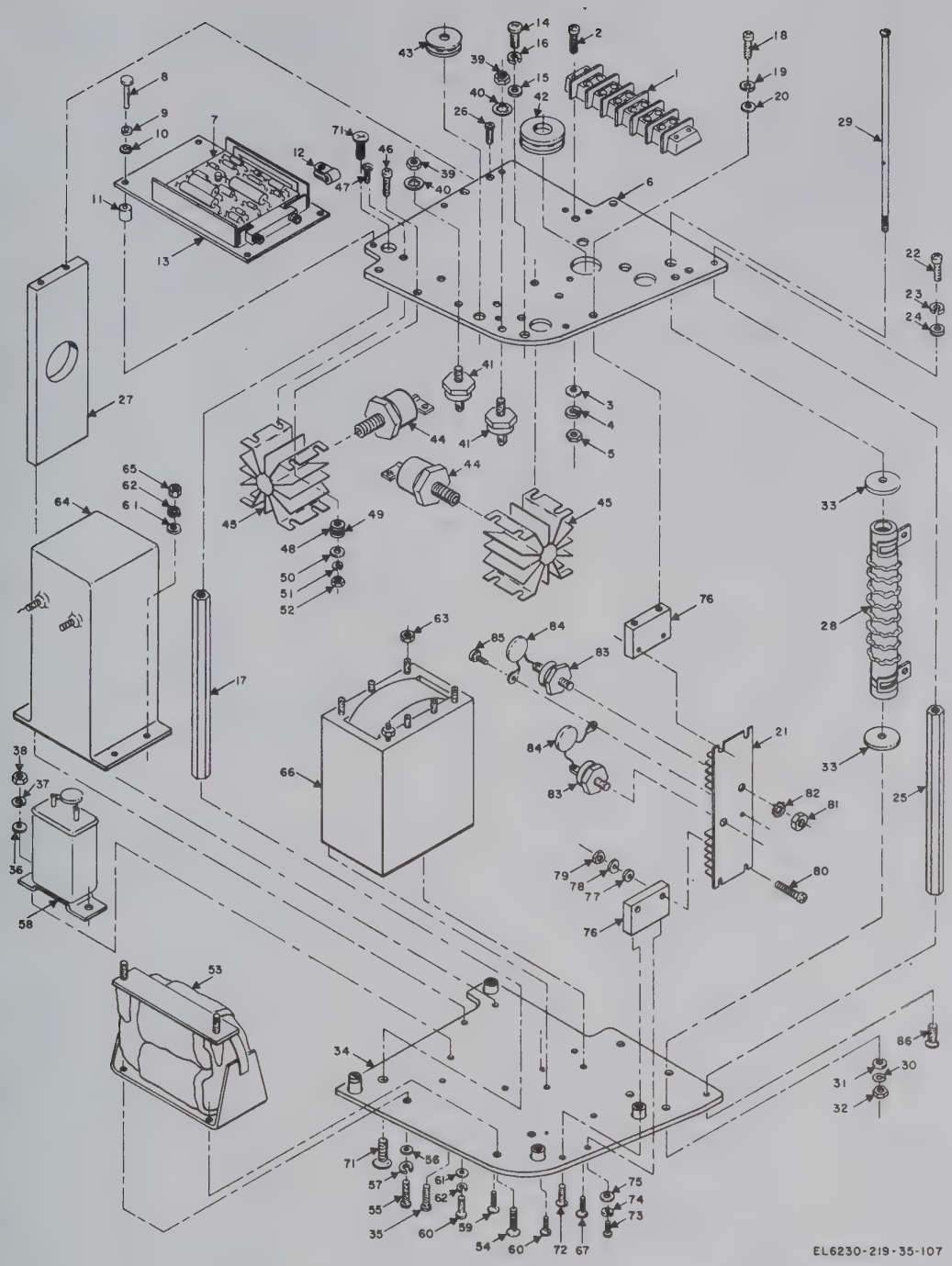
(2) Using an ohmmeter, make the measurements and take the corrective actions listed in the chart below. If trouble persists, refer the converter to depot for repair.

Check for	*Meter (+) to*	*Meter (-) to*	*Scale*	*Good indication (ohms ±5%)*	*If failed, possible remedy*
Short Q1	Anode Q1	TB1—4	RX1	Infinity	Replace Q1.
Short Q2	Anode Q2	TB1—4	RX1	Infinity	Replace Q2.
Short C14	C14—1 (disconnect one end)	C14—2	RX10K	Charging	Replace C14.
Defective CR5	Cathode CR5	Anode CR5	RX1	Infinity	Replace CR5.
	Anode CR5	Cathode CR5	RX1	8	Replace CR5.
Defective CR6	Cathode CR6	Anode CR6	RX1	Infinity	Replace CR6.
	Anode CR6	Cathode CR6	RX1	8	Replace CR6.
Short or open CR1	Cathode CR1	Anode CR1	RX1	Infinity	Replace CR1.
	Anode CR1	Cathode CR1	RX1	11	Replace CR1.
Defective L1	TB—5	T1—2	RX1	Almost 0	Replace L1.
Open T1	T1—3	T1—1	RX1	Almost 0	Replace T1.
Defective CR3	Cathode CR3	Anode CR3	RX1	Infinity	Replace CR3.
	Anode CR3	Cathode CR3	RX1	11	Replace CR3.
Defective CR4	Anode CR4	Cathode CR4	RX1	Infinity	Replace CR4.
	Cathode CR4	Anode CR4	RX1	11	Replace CR4.



1	Lugs	17	Washers	33	Diodes	49	Plate	65	Screws
2	Terminal board	18	Nut	34	Rectifiers	50	Inserts	66	Standoffs
3	Screws	19	Washer	35	Screws	51	Insulator	67	Heat sink
4	Lockwashers	20	Screw	36	Lockwashers	52	Transformer	68	Screw
5	Screws	21	Screws	37	Flat washers	53	Screws	69	Nuts
6	Nuts	22	Bracket	38	Resistor	54	Capacitor	70	Nuts
7	Retaining plate	23	Screws	39	Fiber washer	55	Screws	71	Lockwashers
8	Washers	24	Heat sink	40	Bushing	56	Washers	72	Flat washers
9	Component plate	25	Screw	41	Fiber washer	57	Nuts	73	Capacitors
10	Printed circuit board	26	Lockwashers	42	Standoff	58	Capacitor	74	Screw
11	Screws	27	Washers	43	Diodes	59	Screws	75	Screw
12	Washers	28	Nuts	44	Screws	60	Nuts	76	Cover
13	Lockwashers	29	Locknuts	45	Insert	61	Washers	77	Capacitor
14	Cable clamp	30	Nuts	46	Washers	62	Inductor	78	Nut
15	Chassis	31	Lockwashers	47	Nuts	63	Screws	79	Nut
16	Nuts	32	Flat washers	48	Bracket	64	Plate	80	Insert

Figure 4—5. Converter assembly (Varo model 9912), exploded view.



1 Terminal board
2 Screws
3 Washers
4 Lockwashers
5 Nuts
6 Component plate
7 Printed circuit board
8 Screws
9 Washers
10 Lockwashers
11 Insulators
12 Clamp
13 Protective plate
14 Screw
15 Flat washer
16 Lockwasher
17 Standoff
18 Screw
19 Lockwashers
20 Flat washer
21 Bracket
22 Screw
23 Lockwasher
24 Flat washer
25 Standoff
26 Screws
27 Bracket
28 Resistor
29 Screw
30 Flat washer
31 Lockwasher
32 Nut
33 Insulators
34 Bottom plate
35 Screws
36 Flat washers
37 Lockwashers
38 Nuts
39 Nut
40 Lockwasher
41 Diodes
42 Grommet
43 Grommet
44 Zener diodes
45 Heat sinks
46 Screws
47 Screws
48 Spacers
49 Spacers
50 Flat washers
51 Lockwashers
52 Nuts
53 Inductor
54 Screws
55 Screws
56 Flat washers
57 Lockwashers
58 Capacitor
59 Screw
60 Screw
61 Flat washer
62 Lockwasher
63 Nut
64 Capacitor
65 Nuts
66 Transformer
67 Screw
68 Screws
69 Flat washers
70 Lockwashers
71 Screw
72 Screw
73 Screw
74 Lockwasher
75 Flat washer
76 Nylon standoff
77 Flat washer
78 Lockwasher
79 Nut
80 Screw
81 Nut
82 Lockwasher
83 Diode
84 Capacitors
85 Screw
86 Screw

Figure 4—6. Converter assembly (Melpar model F50001), exploded view.

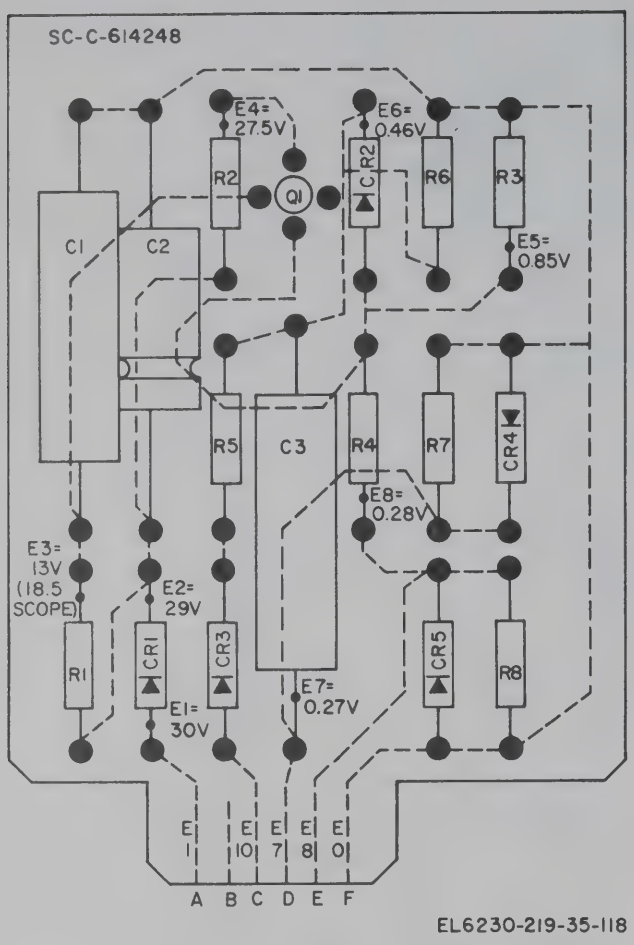


Figure 4—7. Converter assembly printed circuit board.

4—10. Converter Assembly (Varo Model 9948)

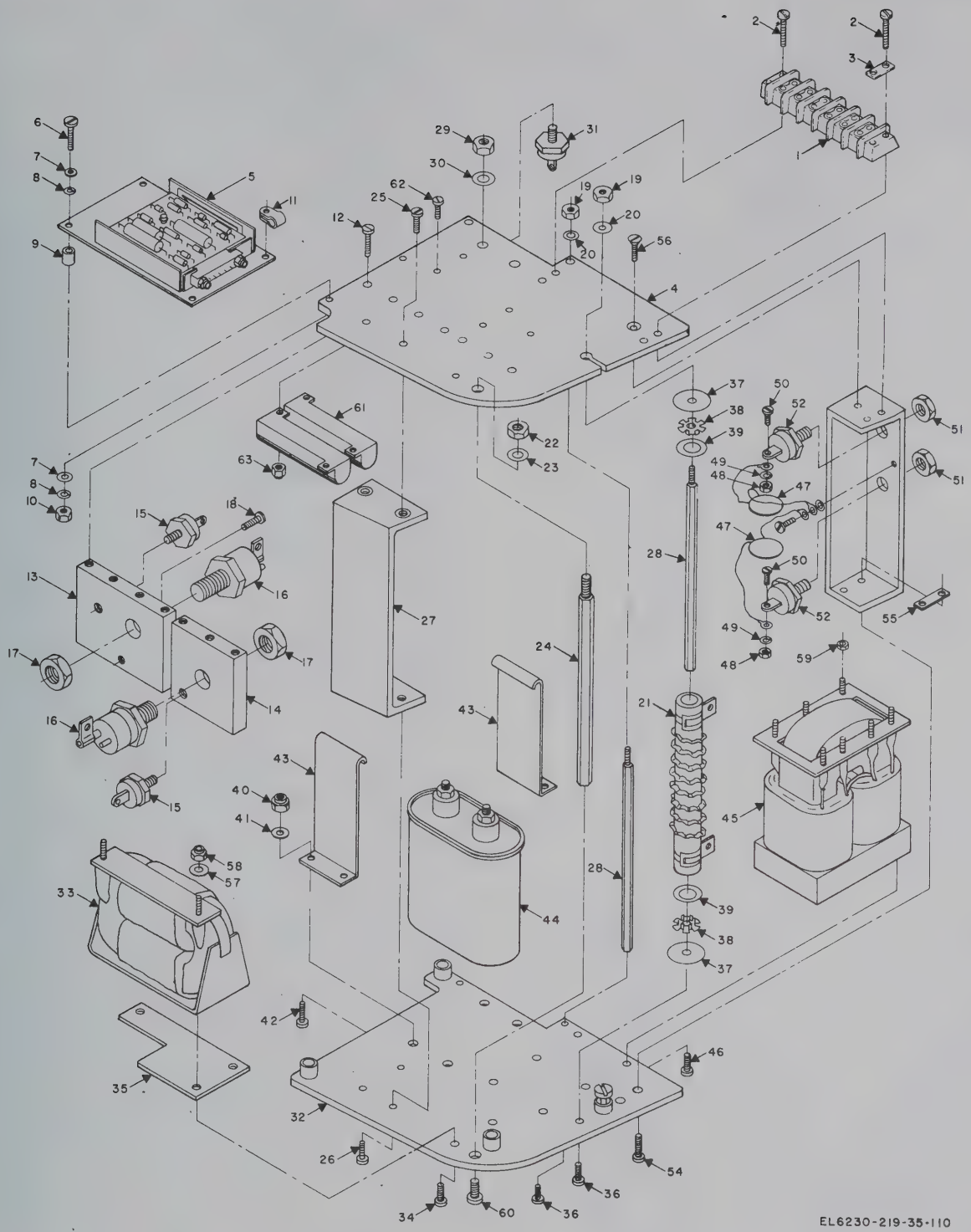
a. General. Using the following procedure, the cause of failure can be found in a minimum of time. Figures 2—6, 6—6, and 6—8 show schematic diagrams of the converter. Figure 6—16 is a wiring diagram of the converter. Figure 4—9 shows parts location. Semiconductor configurations are shown in figure 4—4. Figure 4—7 illustrates the printed circuit board. Refer to these illustrations when troubleshooting. Note that the printed circuit board on this converter is coated with an anti-fungus coating. Be sure to make good connections while making measurements on the board. Refer to section III for printed circuit repair procedures.

b. Procedure.

(1) Make a visual inspection of the converter. Repair obvious defects.

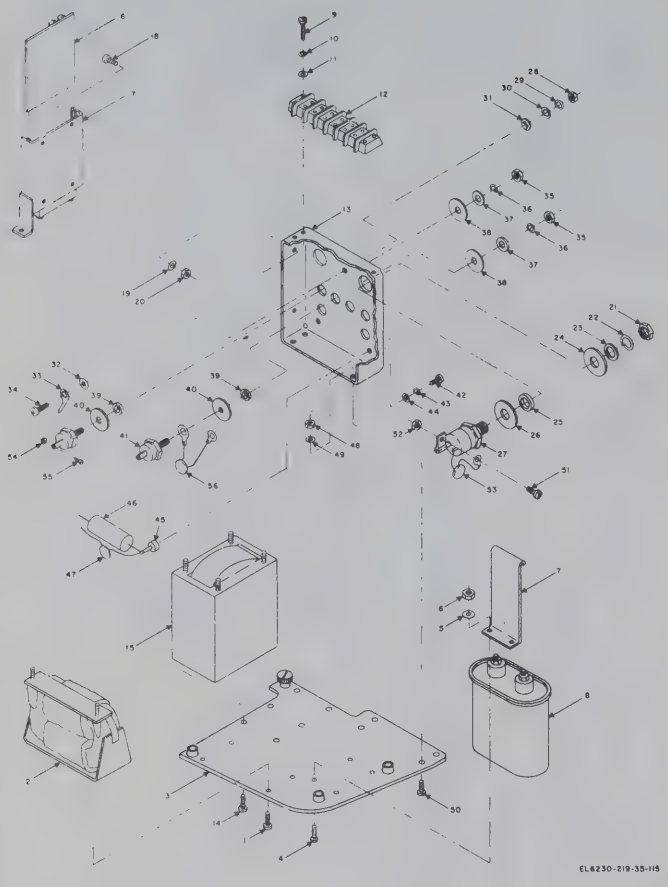
(2) Using an ohmmeter, make the measurements and take the corrective actions listed in the chart below. If trouble persists, refer the converter to depot for repair.

Check for	*Meter (+) to*	*Meter (-) to*	*Scale*	*Good indication (ohms ±5%)*	*If failed, possible remedy*
Defective CR1	Anode CR1	Cathode CR1	RX1	Infinity	Replace CR1.
Defective CR2	Anode CR2	Cathode CR2	RX1	Over 1,000	Replace CR2.
Defective CR3	Anode CR3	Cathode CR3	RX1	Infinity	Replace CR3.
Defective CR4	Anode CR4	Cathode CR4	RX1	Over 200	Replace CR4.
Defective CR5	Anode CR5	Cathode CR5	RX1	Over 200	Replace CR5.
Defective C2	C2+	C2-	RX1	Over 450	Replace C2.
Short SCR1	Anode SCR1	L1—2	RX1	Infinity	Replace SCR1.
Short SCR2	Anode SCR2	L1—2	RX1	Infinity	Replace SCR2.
Defective C9	TB1—5	TB1—4	RX1	Infinity	Replace C9.
Defective CR6	Cathode CR6	Anode CR6 (remove leads)	RX1	Infinity	Replace CR6.
	Anode CR6	Cathode CR6	RX1	Infinity	Replace CR6.
Short C6	C6—1	C6—2	RX10K	Charging	Replace C6.
Short or open CR8	Cathode CR8	Anode CR8	RX1	Infinity	Replace CR8.
	Anode CR8	Cathode CR8	RX1	11	Replace CR8.
Short or open CR9	Cathode CR9	Anode CR9	RX1	Infinity	Replace CR9.
	Anode CR9	Cathode CR9	RX1	11	Replace CR9.
Defective C9	TB1—3	TB1—4	RX10K	Charging	Replace C9.
Defective L1	L1—1	L1—2	RX1	Almost 0	Replace L1.
Defective T1	TB1—5	Anode CR10	RX1	Almost 0	Replace T1.
	TB1—5	Anode CR11	RX1	Almost 0	Replace T1.
Defective CR10	Cathode CR10	Anode CR10	RX1	Infinity	Replace CR10.
	Anode CR10	Cathode CR10	RX1	11	Replace CR10.



1 Terminal board	10 Locknuts	19 Locknut	28 Standoff	37 Washer	46 Screws	55 Spacer
2 Screws	11 Clamp	20 Washer	29 Nut	38 Insulator	47 Capacitors	56 Screw
3 Spacer	12 Screws	21 Resistor	30 Washer	39 Washer	48 Nuts	57 Washer
4 Component plate	13 Heat sink	22 Nut	31 Diode	40 Locknuts	49 Washers	58 Nut
5 Printed circuit board	14 Heat sink	23 Washer	32 Bottom plate	41 Washers	50 Screws	59 Nut
6 Screws	15 Diode	24 Standoff	33 Inductor	42 Screws	51 Nuts	60 Bolt
7 Flat washers	16 Diode	25 Screw	34 Screws	43 Clamps	52 Diodes	61 Resistors
8 Lockwashers	17 Nut	26 Screw	35 Spacer	44 Capacitor	53 Bracket	62 Screws
9 Inserts	18 Screw	27 Bracket	36 Bolt	45 Transformer	54 Screws	63 Nuts

Figure 4—8. Converter assembly (Varo model 9924), exploded view.



1 Screws
2 Inductor
3 Baseplate assy
4 Screws
5 Flat washers
6 Nuts
7 Brackets
8 Capacitor
9 Screws
10 Lockwashers
11 Flat washers
12 Terminal board
13 Heat sink assy
14 Screws
15 Transformer
16 Component board assy
17 Mounting bracket assy
18 Screws
19 Flat washers
20 Nuts
21 Nuts
22 Lockwashers
23 Flat washers
24 Insulating washers
25 Bushings
26 Insulating washers
27 Scr
28 Nut
29 Lockwasher
30 Flat washer
31 Bushing
32 Flat washer
33 Lug
34 Screw
35 Nuts
36 Lockwashers
37 Flat washers
38 Insulating washers
39 Bushings
40 Insulating washers
41 Rectifiers
42 Screws
43 Lockwashers
44 Flat washers
45 Terminals
46 Capacitor
47 Capacitor
48 Nuts
49 Flat washers
50 Screws
51 Screws
52 Nuts
53 Capacitor
54 Nuts
55 Screws
56 Capacitor

Figure 4—9. Converter assembly (Varo model 9948) exploded view.

4–11. Converter Assembly (ITT Model 6484)

a. General. The purpose of the troubleshooting procedures is to enable the maintenance operator to isolate the malfunction to a particular component of the converter. Once the faulty component is located, it is to be removed and replaced. In *c* below, items 1 through 4 are concerned with faults which may occur in a complete searchlight. Subsequent items refer to a converter which is being evaluated in a bench type test setup. In most cases of converter malfunction due to converter component failure, converter input circuit breaker CB1 will actuate. For this reason, the converter should be operated with the output open circuited to determine whether an internal fault exists. In *c* below, items 4 through 13 are trouble symptoms based on operating in an open circuit, that is, with converter terminals 1, 2, and 3 disconnected. It should be noted that the input current to the converter under open circuit conditions and with the input voltage set to 28 volts dc, will be approximately 7 amperes. When troubleshooting for a shorted transistor by means of an ohmmeter, disconnect the collector interconnection wires. The normal collector-to-emitter resistance is very high (greater than 300 kilohms); but with the interconnecting wires attached, the resistance measures 10 to 12 ohms. A reading substantially less than 10 ohms indicates a shorted transistor. Another aid in troubleshooting with an ohmmeter is to pull out on the circuit breaker indicator knob which disconnects the circuitry on the primary side of the transformer from that on the secondary side. The circuit breaker can be used as a switch in this case. The white collar on the circuit breaker knob indicates the breaker is open circuited. For the purpose of converter troubleshooting, it is assumed that all other circuitry in the searchlight is operating normally. In *c* below, items 14 through 17 are symptoms observed when operating a converter into rated loads. The rated load for the igniter ac (TB1—1 and TB1—2) is 20 ohms. The rated load for the plasma output (TB1—3 to TB1—5) is 1.1 ohms.

b. Resistance and Voltage Charts.

(1) *Resistance chart.* The resistance values in the following chart are obtained with an ohmmeter having the positive lead from the ohmmeter connected to the terminal listed in the FROM column. This procedure must be followed due to the unidirectional conduction characteristics of semiconductor devices.

Resistance chart

From	*To*	*Resistance*
TB1—1	TB1—2	0.4 ±0.2
TB1—1	TB1—3	30[b]
TB1—1	TB1—4	12.5 ±0.3
TB1—1	TB1—4	∞[a]
TB1—1	TB1—5	0.5 ±0.2
TB1—3	TB1—2	10K ±1K
TB1—3	TB1—4	10K ±1K
TB1—3	TB1—4	∞[a]
TB1—3	TB1—5	10K ±1K
TB1—4	TB1—3	50
TB1—4	TB1—3	∞[a]
TB1—4	TB1—5	7[c]
TB1—4	TB1—5	∞[a]
TB1—5	TB1—3	30[b]
TB1—5	TB1—4	12 ±0.3
TB1—5	TB1—4	∞[a]

[a]This reading is taken with the circuit breaker deactivated (in the out position). This is accomplished by grasping the circuit breaker knob and pulling out until a snap is heard.

[b]These resistance values vary somewhat depending upon the ohmmeter voltage since it is a measurement of the forward resistance of a diode. A reasonable tolerance is +50 to −10 ohms but can measure as much as +500 ohms.

[c]This reading involves the base-to-collector forward conduction of the transistor junctions and may vary depending upon the ohmmeter voltage. A reading of less than ½ ohm indicates a collector-to-emitter short. A reading of approximately 5 ohms indicates a base-to-emitter short.

(2) *Voltage chart.* Referring to figure 4—10, the meters shown indicate the voltages and currents listed in the following chart under full-load and no-load conditions as listed. Switches S2 and S3 are open for no-load conditions.

CAUTION

The converter should not be operated at full load for more than 5 seconds in any 1-minute period. Circuit breaker CB1 actuates due to heat rise if this time is exceeded. No damage results unless CB1 is bypassed. The converter can be operated for a longer period than 5 seconds if operated under no-load conditions.

Voltage chart
(Rated voltage input 28 volts dc)

Meter	*No load*	*Full load*	*Units*
M1	0	4 ±0.5	Amperes ac
M2	105 ±5	80 ±5	Volts ac
M3	0	12 ±2	Amperes dc
M4	120 ±5	41 ±2	Volts dc
M5	28	28	Volts dc
M6	6 ±1	40 ±2	Amperes dc

c. Troubleshooting Chart.

Item No.	*Trouble symptom*	*Probable trouble*	*Checks and corrective actions*
1	Igniter does not function	No ac output on converter terminals 1 and 2	Visually examine converter circuit breaker for actuation (white band showing on extended knob of CB). Remove converter for further analysis.
2	Igniter produces ionizing arc but lamp does not light.	No dc plasma at converter terminal No. 3	Remove converter for further analysis.
3	Searchlight does not ignite on command.	No converter output	Remove converter for further analysis.
4	Circuit breaker actuates immediately upon application of input power.	Shorted transistor	Make resistance check to locate shorted transistor. Replace transistor.
5	Circuit breaker actuates immediately upon application of input power.	Shorted rectifier (CR1, CR2, CR3, or CR4)	Make resistance check to locate shorted rectifier. Disconnect T2 secondary terminals to measure resistance. Replace rectifier.
6	Open circuit plasma voltage low.	R10 open	Make resistance check to see that R10 is open. Replace R10.
7	Open circuit plasma voltage low.	Open rectifier (CR1 or CR4)	Disconnect wires on T2, terminals 4 and 8. Make resistance check to locate open rectifier. Replace rectifier.
8	CB1 actuates upon application of power.	Shorted capacitor (C2, C3, C4, or C5)	Measure resistance TB1—3 to TB1—5 (plus lead on TB1—3). Should be greater than 10K. Replace capacitor.
9	Open circuit plasma voltage low.	T1, open secondary	Measure resistance, emitter to base to be less than 5 ohms. Replace T1.
10	Open circuit plasma voltage low.	T1, open primary	Disconnect T1 primary and mea-

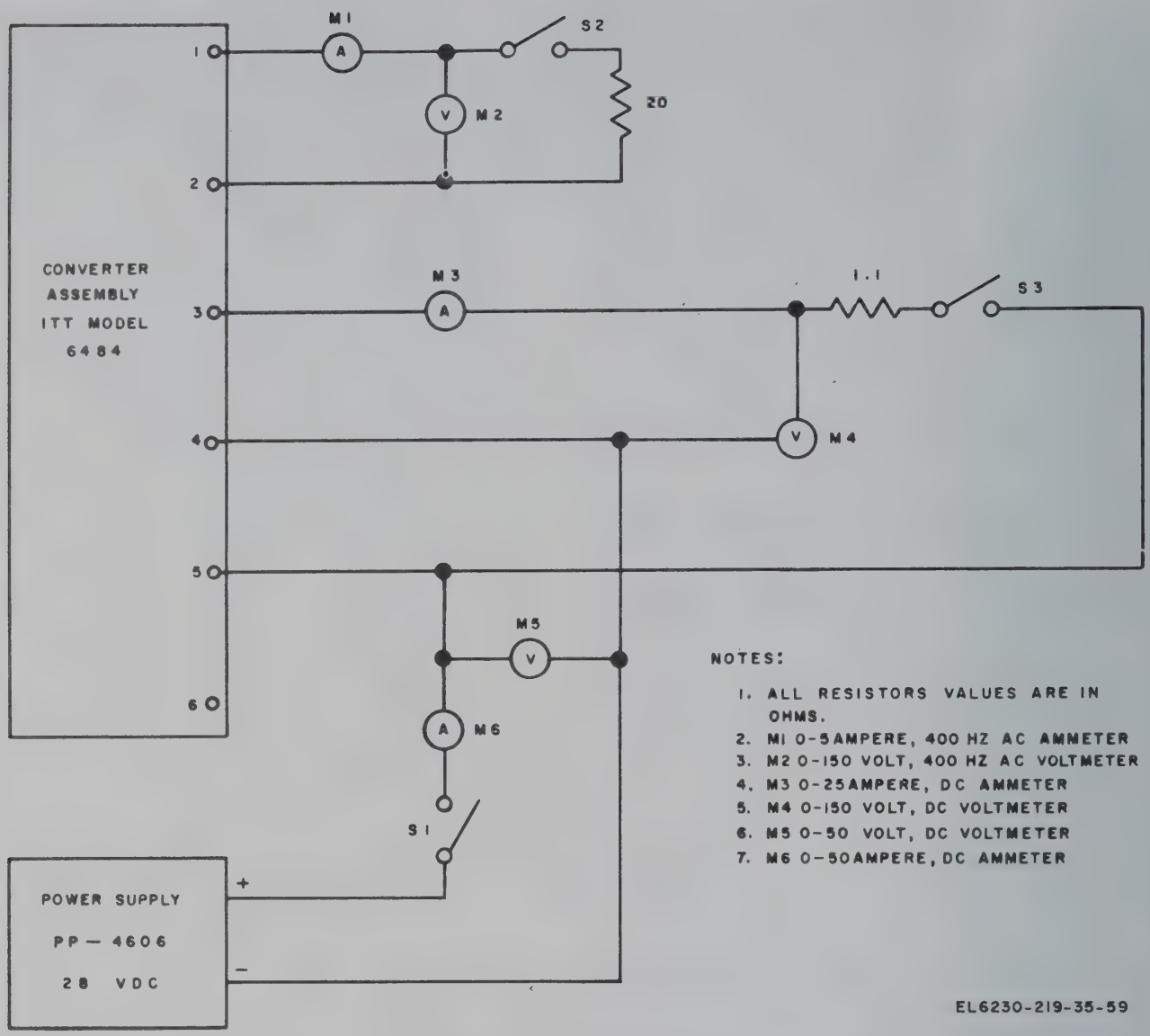


Figure 4—10. Bench test hookup.

Item No.	*Trouble symptom*	*Probable trouble*	*Checks and corrective actions*
			sure resistance. Should be less than 1 ohm. Replace transformer.
11	CB1 actuates upon application of input power.	R1 open	Measure resistance across R1 with T2 terminal 10 disconnected. Correct value is 0.5 ohm. Replace R1.
12	CB1 actuates upon application of input power.	R6 open	Measure resistance TB1—5 to TB1—4. Correct value is 12 ohms. Replace R6.
13	CB1 actuates upon application of input power.	R10 open	Measure resistance TB1—5 to TB1—4. Correct value is 12 ohms. Replace R10.
14	Converter outputs gradually decline.	Open transistor	Measure ac rms voltage across R2, R3, R4, R7, R8, and R9. Absence of voltage indicates open transistor. Correct value is approximately ½ volt. Replace transistor.

Item No.	Trouble symptom	Probable trouble	Checks and corrective actions
15	Plasma current less than 8 amperes.	CR5 open	Measure resistance CR5 anode to cathode. Resistance should be less than 50 ohms. Replace CR5.
16	Plasma current less than 8 amperes.	R12 or R14 open	Measure resistance across R12. Correct value is 2.5 ohms; if R12 or R14 is open, 5 ohms. Replace open resistor.
17	Plasma current less than 8 amperes.	R10 open	Measure resistance across R10. Correct value is 15 ohms. Replace R10.

Section III. PRINTED CIRCUIT BOARD REPAIR

4-12. General

The searchlight subassembly contains printed circuit boards. The general support maintenance echelon is authorized to repair these boards. This section sets forth techniques to follow when making printed circuit board repairs.

4-13. Parts Removal

a. Removal of Protective Coating. The protective coating on the printed circuit board must be removed before starting repairs. Chip the coating away with a metal pick, knife, or other suitable instrument. If chipping is not successful, apply a hot soldering iron to the coating to soften it. Never use a solvent to remove the coating. Solvents are difficult to control and may loosen the copper foil from the printed circuit board.

b. Unsoldering Defective Part. The point at which the defective part is jointed to the foil must be unsoldered. Be sure to use a small soldering iron to avoid damage from excessive heat. Apply the iron tip to the pigtail lead on the part and not on the foil. Remove the iron as soon as the solder melts and brush the excessive solder away.

c. Removal of Defective Part. If the ends of the part leads have been squeezed out of shape, cut them off to permit withdrawal of the leads. If the leads are bent, straighten them before removal to prevent damage to the foil when the part is removed. If some solder still remains on the leads, apply the soldering iron to the solder momentarily and pull the leads through the foil while the solder is soft. Pull the part straight up from the board without forcing or twisting it. Rough handling can damage the board or pull the foil loose.

d. Clearing Lead Hole.

(1) Molten solder sometimes flows into the lead holes while the part is being removed. Avoid using a soldering iron to remove the solder because the amount of heat required may loosen the foil. Do not clean the hole by heating the solder when inserting the new part; the lead may catch the edge of the foil and tear it away from the board.

(2) On boards where the leads are passed through metal eyelets, the solder often flows into the eyelet where it cannot be brushed away. Tap the board sharply while the solder is still soft, and force it to flow out. If the solder cannot be removed this way, use a twist drill of suitable size in a pin vise and carefully drill the solder out from the foil side of the board. This will form a hole large enough to insert the new part lead. Drilling from the other side of the board can loosen the foil as the drill passes through it.

4-14. Parts Installation

a. Scrape the leads clean with a knife. Bend the leads carefully until the distance between them is such that they will fit into the holes from which the defective part was removed. Mount the part and clinch or swage the leads close to the foil. This will form a strong mechanical joint.

b. Apply a small amount of flux to the joint. Touch the soldering iron tip to the part lead and apply a small amount of solder (fluxless 60/40 solder) to the junction of the lead and the foil. Remove the iron as soon as the solder flows into the joint. Hold the lead firmly until the solder sets. Remove any excess flux with a small amount of alcohol.

c. The flux used is of great importance; no known commercial flux is as noncorrosive and

nonconductive as a rosin-alcohol mixture. Use no flux other than that specified.

d. After the solder cools, inspect the joint to see that it is clean and that solder has not flowed or dropped where it can cause short circuits. Newly soldered joints will become corroded if left uncoated, especially in damp climates. Apply a coating of varnish (MIL—V—173A) to the bare areas. Cover the area completely and overlap the surrounding coated areas.

4–15. Printed Conductor Repair

The printed conductor, which is usually a thin copper foil, can become damaged and cause an open circuit. Generally, when the foil is damaged in one place, it is probably damaged at other points also. Therefore, the entire board must be replaced. A defect in more than one place on a very small board (relay panel assembly) means that it must be discarded, because the space is inadequate for repair. When repairs must be made and the space is adequate, the procedure below should be followed.

a. Remove the loose or charred portions of the conductor. Bend a piece of tinned copper wire, about No. 20 gauge, into the shape of a staple. The staple must be long enough to span the defective portion of the conductor and be clinched about 1/4 inch from the end after being inserted through the assembly board.

b. Drill two small holes of proper size to receive the staple ends. The holes must not be drilled through the foil, but near the foil so that the staple will be parallel to the foil. Contact with the conductor is greater when the staple is bent diagonally rather than at right angles to the foil. If possible, the staple should make contact for about 1/4 inch.

c. If the printed wiring is about 1/4 inch wide, drill the holes through the foil from the wiring side. Insert the staple from the component side and clinch the ends as before. The soldering procedure is the same as in preceding operations.

d. Where it is convenient, insert the staple through the holes from the wiring side. Drill two extra holes in the board from the component side and adjacent to the original holes. Bend the staples back into these holes and clinch them diagonally across the conductor and solder as before. Apply a protective coating of varnish to all uncoated areas.

Section IV. DISASSEMBLY AND REASSEMBLY

4–16. General

The following paragraphs give the procedures for overhauling the assemblies allocated as general support responsibilities. Overhaul requires that the assembly be completely disassembled and all parts examined for evidence of wear or failure. All defective parts must be repaired or replaced and all scratched surfaces repainted. Refer to paragraph 3—20 for repair techniques.

4–17. Lamp Housing
(fig. 4—11)

a. Disassembly.

(1) Remove ring (1), shim (2), screw (4), lockwasher (5), washer (6), and band (7).

(2) Remove screw (23), lockwasher (5), ring (3), and glass (17).

(3) Remove bearing (8) and upper ring (9).

(4) Remove screw (14) and upper insert (13).

(5) Remove upper rings (10) and (11).

(6) Remove screw (45), lockwasher (5), and struts (44) and (22).

(7) Remove screw (14), shield (46), and lower insert (38).

(8) Remove screw (4) and refractor (47).

(9) Remove filters (15) and (16).

(10) Remove screw (25), lockwasher (26), and washer (27) from collar (28).

(11) Remove pin (31) from gear (32).

(12) Remove collar (28), shim (29), and bearing (30).

(13) Remove gear (32), bearing (37), and gear (35).

(14) Remove bearing (37) and gear (18).

(15) Remove lower ring (43) and upper ring (42) from lower ring (41).

(16) Remove screw (20) and remove actuator (19).

(17) Inspect, clean, repair, and lubricate (para 3–20*b*).

b. Reassembly.

(1) Replace actuator (19) with screw (20).

(2) Replace upper ring (42) and lower ring (43) to lower ring (41).

(3) Replace gear (18) and bearing (37).

(4) Replace gear (35) and bearing (37).

(5) Replace gear (32), bearing (37), and pin (31).

(6) Replace shim (29), collar (28), lower flange (24), and collar (28) with washer (27), lockwasher (26), and screw (25).

(7) Replace refractor (47) with screw (48) and struts (44) and (22).

(8) Replace lower insert (38) with screw (14).

(9) Attach struts (44) and (22) to gear (18) with screw (45) and lockwasher (5).

(10) Replace shield (46), secure with screw (14).

(11) Replace filter (16) and filter (15).

(12) Replace upper ring (10) and ring (11).

(13) Replace upper insert (13) with screw (14).

(14) Replace bearing (8) and upper ring (9).

(15) Replace bearing (8) and ring (3).

(16) Replace glass (17) and band (7).

(17) Replace screw (23), lockwasher (5), ring (1), screw (4), lockwasher (5), and washer (6).

(18) Replace shim (2) and ring (1).

4–18. Heat Exchanger Elbow

(fig. 4–12)

a. Disassembly.

(1) Remove screw (6) and washer (7) holding elbow (5) to the heat exchanger.

(2) Remove screw (4), lockwasher (3), and washer (2) holding thermoswitch (1) to the elbow.

(3) Remove screw (8) holding plate assembly (12) to the heat exchanger.

(4) Inspect, clean, repair, and lubricate (para 3–20*b*).

b. Reassembly.

(1) Replace gasket (13) and plate assembly (12) on the heat exchanger and secure with screw (8).

(2) Replace thermoswitch (1) on elbow (5) securing with washer (2), lockwasher (3), and screw (4).

(3) Replace elbow (5) on the heat exchanger, securing with washer (7) and screw (6).

4–19. Heat Exchanger Duct and Blower

(fig. 4–13)

a. Disassembly.

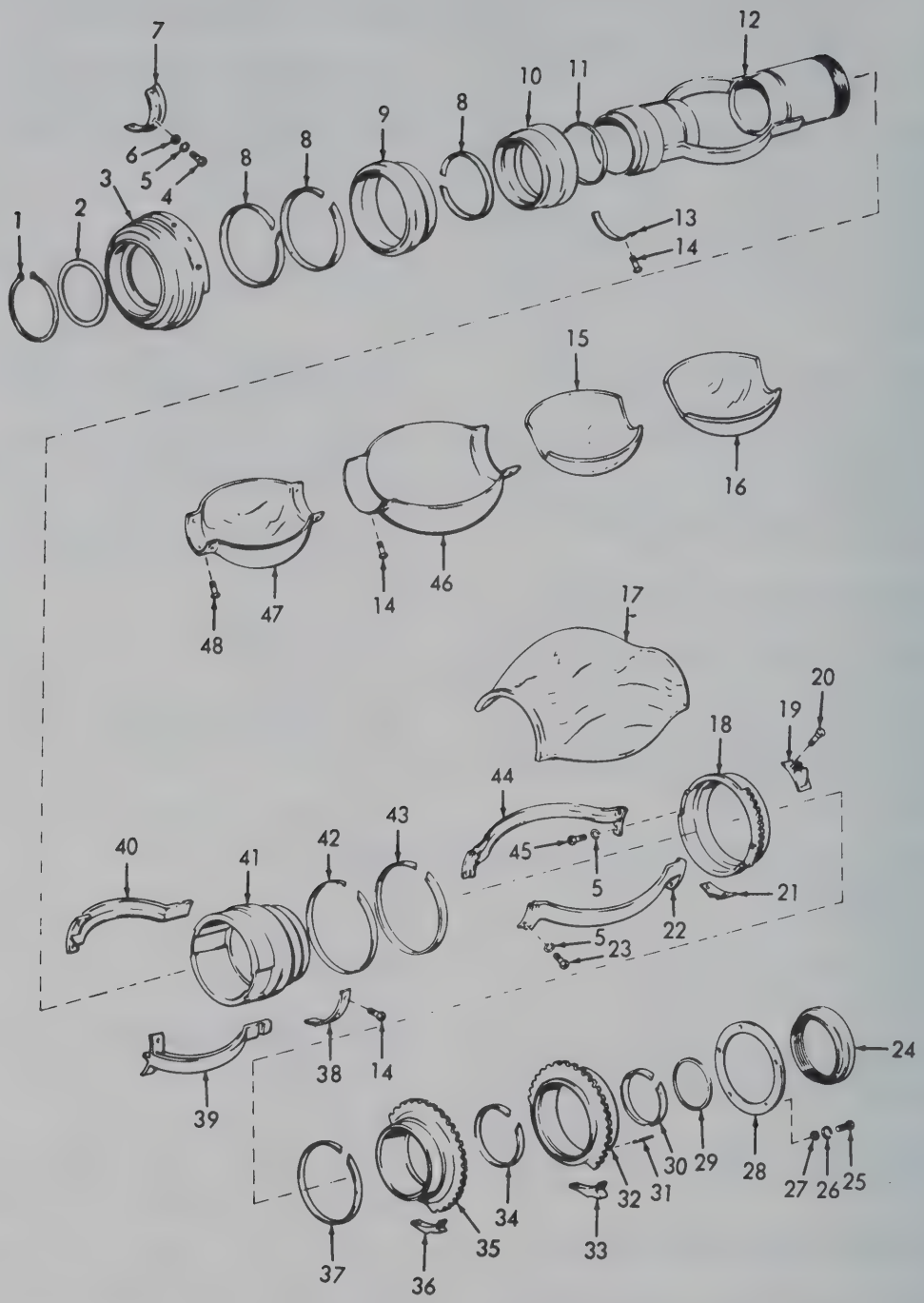
(1) Remove screw (27), lockwasher (26) washer (25), and chassis cover (28).

(2) Remove screw (24), lockwasher (23), washer (22), blower (21), and gasket (19) from the heat exchanger.

(3) Remove screw (11) and cover (3) from elbow (12).

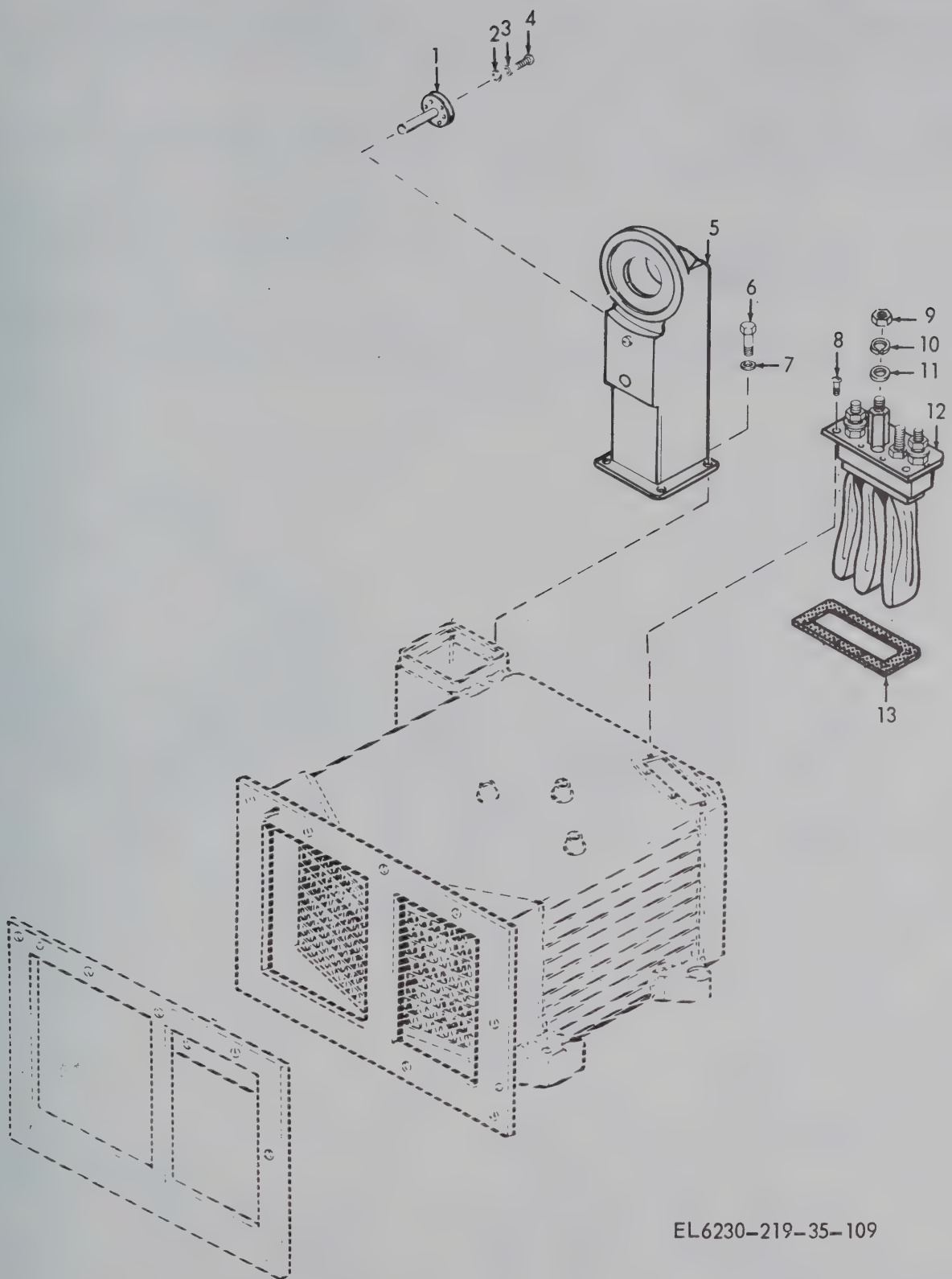
(4) Remove screw (4), washer (7), lockwasher (8), nut (9), and thermoswitch (6).

(5) Remove screw (18), lockwasher (17), washer (16) and remove terminal board (15).



1 Ring MP12	13 Insert 6MP12	25 Screw H9	37 Bearing 6MP33
2 Shim 6MP6	14 Screw	26 Lockwasher H3	38 Insert 6MP13
3 Ring 6MP7	15 Filter	27 Washer	39 Strut 6MP29
4 Screw	16 Filter 6MP14	28 Collar 6MP17	40 Strut 6MP28
5 Lockwasher 6H2	17 Glass 6MP2	29 Shim 6MP18	41 Ring 6MP27
6 Washer 6H3	18 Gear 6MP34	30 Bearing 6MP19	42 Ring 6MP30
7 Band	19 Actuator 6MP25	31 Pin 6MP21	43 Ring 6MP31
8 Bearing 6MP8	20 Screw	32 Gear 6MP20	44 Strut 6MP3
9 Ring	21 Actuator 6MP26	33 Actuator 6MP22	45 Screw 6H5
10 Ring 6MP15	22 Strut 3MP1	34 Bearing 6MP23	46 Shield 6MP10
11 Ring 6MP32	23 Screw 6H4	35 Gear 6MP24	47 Refractor
12 Housing	24 Flange 6MP16	36 Actuator 6MP35	48 Screw

Figure 4—11. Lamp housing, exploded view.



1 Thermoswitch 13A3
2 Washer
3 Lockwasher
4 Screw
5 Elbow 13MP7
6 Screw 13H5
7 Washer
8 Screw
9 Nut 13A1H1
10 Washer 13A1H3
11 Washer
12 Plate assembly 13A1
13 Gasket 13MP16

Figure 4—12. Heat exchanger elbow, exploded view.

(6) Remove screw (1), washer (7), lockwasher (8), nut (9) and remove clamp (10) from cover (3).

(7) Inspect, clean, repair, and lubricate (para 3–20*b*).

b. Reassembly.

(1) Replace clamp (10) and secure with screw (1), lockwasher (8), and washer (7).

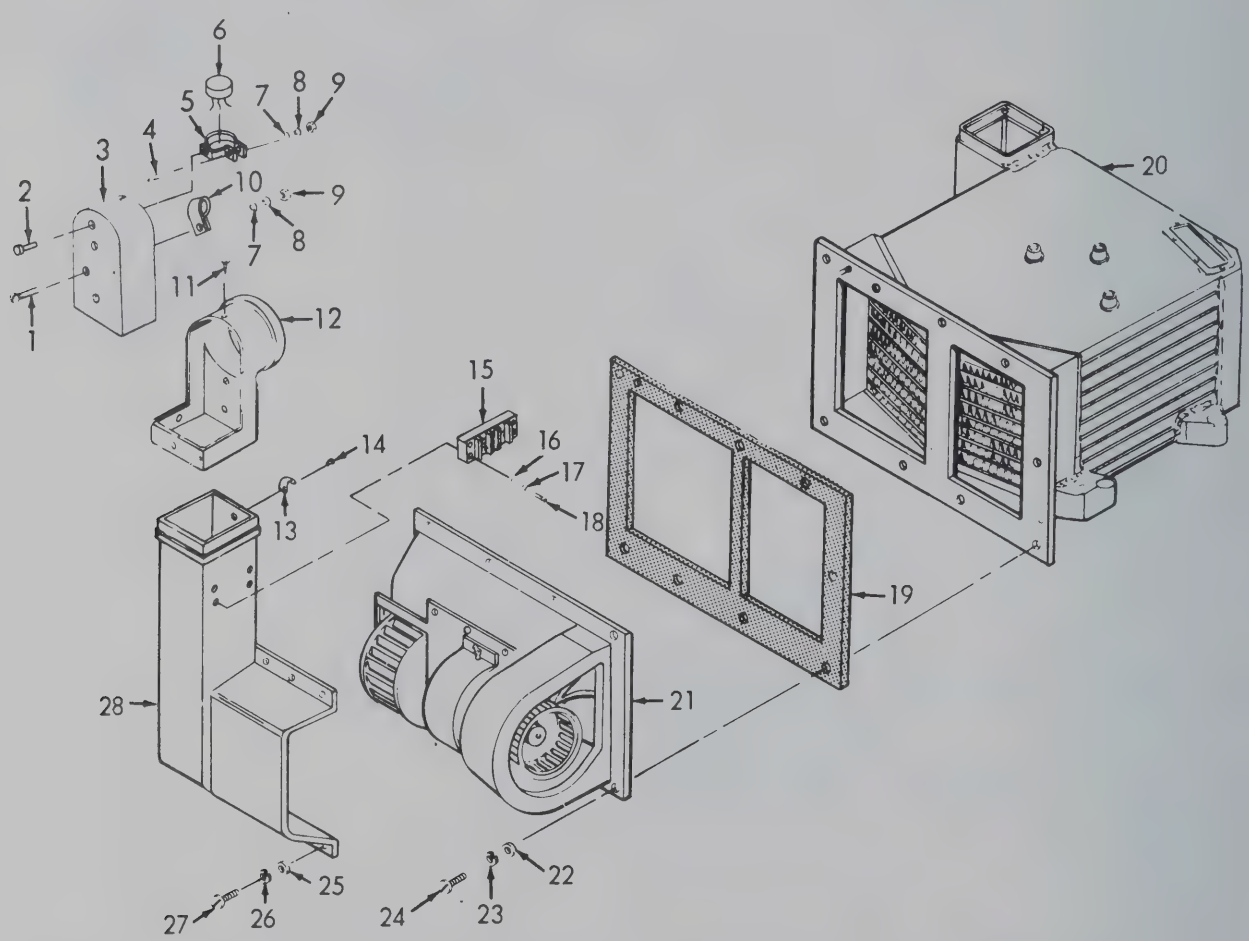
(2) Replace terminal board (15) and secure with screw (18), lockwasher (17), and washer (16).

(3) Replace thermoswitch (6) in clamp (5) and secure with screw (4), washer (7), lockwasher (8), and nut (9).

(4) Replace cover (3) on elbow (12) and secure with screw (11).

(5) Replace chassis cover (28) on blower (21) and secure with screw (27), lockwasher (26), and washer (25).

(6) Replace blower (21) and gasket (19) to the heat exchanger and secure with screw (24), lockwasher (23), and washer (22).



1 Screw	11 Screw 13A5H1	19 Gasket 13MP8
2 Rivet 13A7H1	12 Elbow 13A5	20 Heat exchanger 13A4
3 Cover 13A7	13 Hook 13A8MP3	21 Blower
4 Screw 13H24	14 Rivet 13A8H2	22 Washer
5 Clamp	15 Terminal board 40TB3	23 Lockwasher H2
6 Thermoswitch	16 Washer	24 Screw
7 Washer	17 Lockwasher 13H28	25 Washer
8 Lockwasher	18 Screw 13H23	26 Lockwasher H11
9 Nut		27 Screw 13H18
10 Clamp		28 Chassis cover 13A8MP1

Figure 4–13. Heat exchanger duct and blower, exploded view.

4-20. Heat Exchanger Assembly
(fig. 4—14)

a. Disassembly.

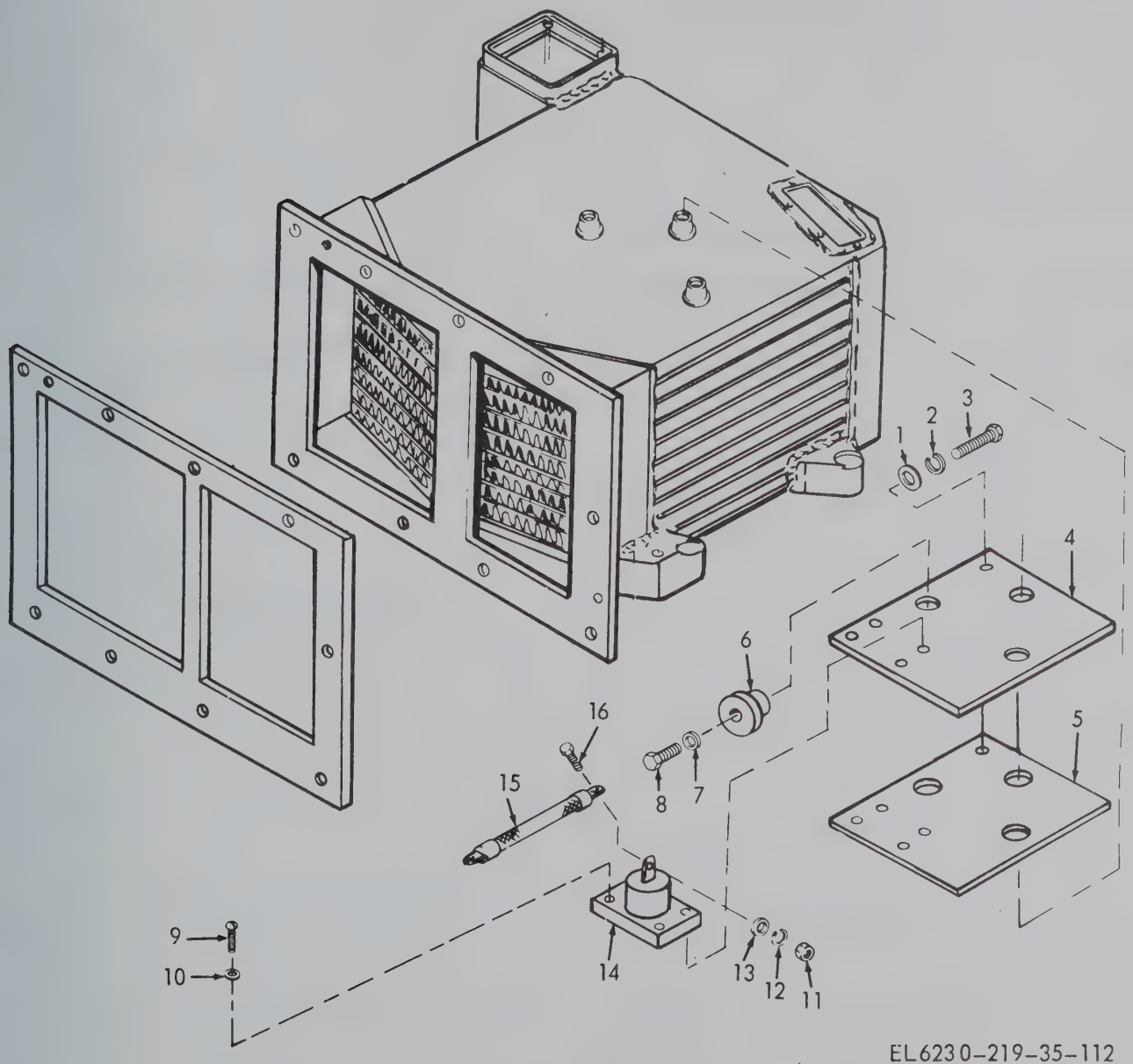
(1) Remove screw (8), washer (7), and bushing (6) and remove rectifier assembly from the heat exchanger.

(2) Remove screw (9) and washer (10) from rectifier (14) and remove rectifier from the heat exchanger.

(3) Remove bolt (3), lockwasher (2), and washer (1) from heat sink (4) and remove heat sink (4) from insulator (5).

(4) Remove nut (11), lockwasher (12), washer (13), and bolt (16) and remove strap (15) from rectifier (14).

(5) Inspect, clean, repair, and lubricate (para 3—20*b*).



1 Washer	5 Insulator	9 Screw 13H3	13 Washer
2 Lockwasher H6	6 Bushing	10 Washer	14 Rectifier
3 Bolt	7 Washer H5	11 Nut	15 Strap
4 Heat sink	8 Screw	12 Lockwasher	16 Bolt

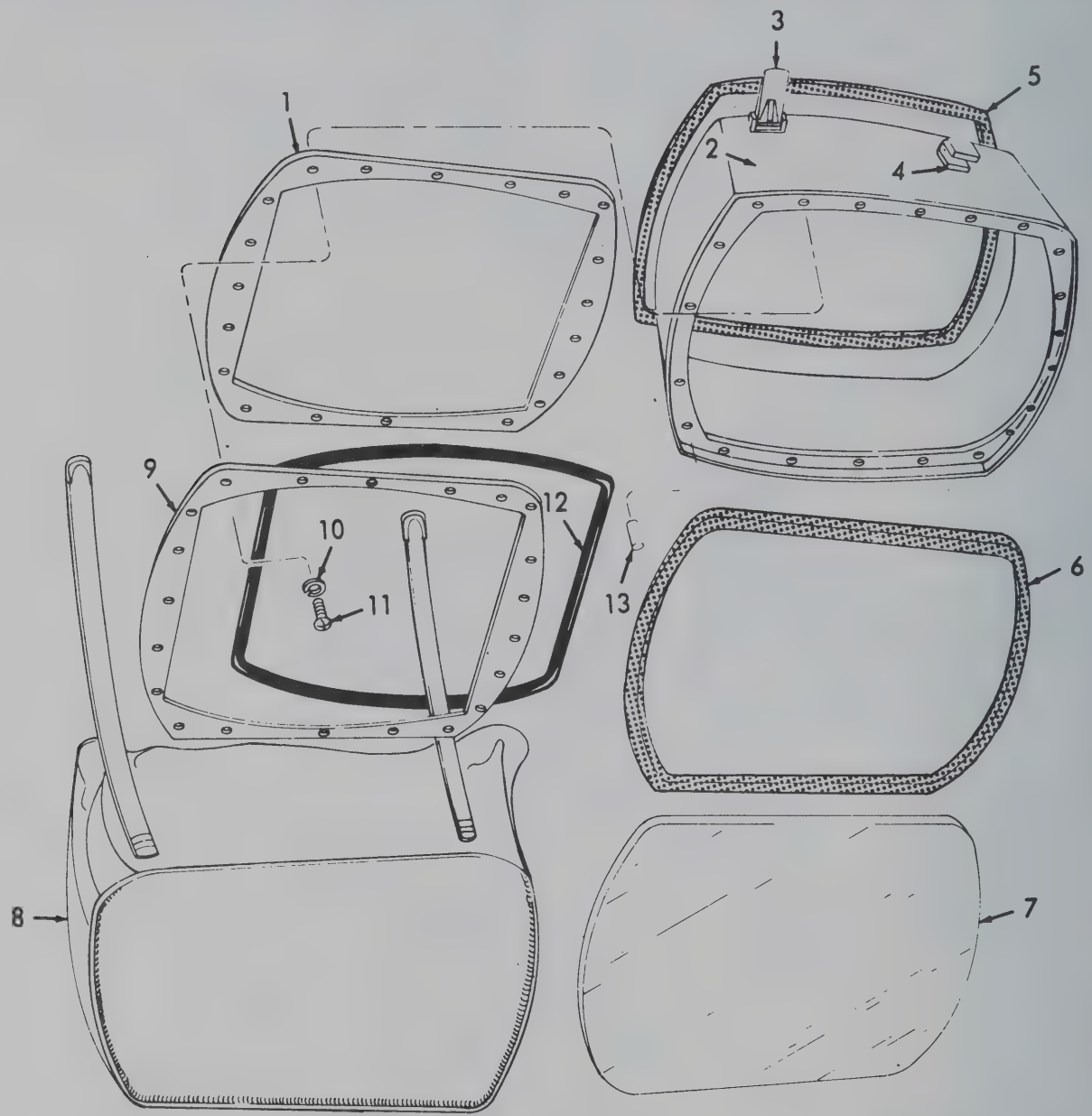
Figure 4—14. Heat exchanger, exploded view.

b. Reassembly.

(1) Replace strap (15) and secure to rectifier (14) with bolt (16), washer (13), lockwasher (12), and nut (11).

(2) Replace heat sink (4) on insulator (5) and secure with bolt (3), lockwasher (2), and washer (1).

(3) Replace rectifier (14) on heat sink (4) and secure with screw (9) and washer (10).



EL6230-219-35-64

1 Retainer E2639
2 Cowling E2695
3 Latch assembly 3A1MP1
4 Hook 3A1MP2
5 Gasket 3MP4
6 Gasket 3MP3
7 Glass 3MP2
8 Cover assembly 1
9 Bezel 3MP1
10 Washer
11 Screw
12 Ring
13 Insert 3A1MP4

Figure 4—15. Cowling, lens, and cover; exploded view.

(4) Replace the rectifier assembly on the heat exchanger and secure with bushing (6), washer (7), and screw (8).

4-21. Cowling Glass

(fig. 4—15)

a. Disassembly.

(1) Remove screw (11), washer (10) and remove bezel (9), ring (12), and retainer (1).

(2) Remove glass (7) from gasket (6).

(3) Remove gasket (6) from cowling (2).

(4) Inspect, clean, repair, and lubricate (para 3—20*b*).

b. Reassembly.

(1) Apply silicone compound around gasket and place gasket in cowling.

(2) Place glass (7) in gasket (6).

(3) Place retainer (1), ring (12), and bezel (9) over glass (7) and secure bezel (9) to cowling (2) with screw (11) and washer (10).

4-22. Blower Motor

(fig. 4—16)

a. Disassembly.

(1) Remove screw (14), lockwasher (15), washer (16), bracket (13), and gasket (10).

(2) Remove screw (36) and washer (35).

(3) Remove the motor assembly from blower chamber (19).

(4) Remove nut (40), washer (22), capacitor (20), diode (24), along with washer (20), lockwasher (22), and screw (23).

(5) Remove retaining ring (33), shim (37), and bearing (11).

(6) Remove retaining ring (12).

(7) Remove setscrew (7) and remove impeller (6).

(8) Remove screw (5), washer (4), cap (9), brush (8), and plate (34).

(9) Remove plate (3) and yoke assembly (1).

(10) Remove bearing (11) and retaining ring (12).

(11) Remove screw (30), lockwasher (29), washer (28), plate (27), and gasket (26) from blower chamber (19).

(12) Inspect, clean, repair, and lubricate (para 3—20*b*).

b. Reassembly.

(1) Replace gasket (26) and plate (27), and secure to blower chamber (19) with screw (30), lockwasher (29), and washer (28).

(2) Replace retaining ring (12) and bearing (11).

(3) Replace armature (39) in yoke assembly (1).

(4) Replace retaining ring (12), bearing (11), and shims (38) and (37).

(5) Replace plate (3) and secure to plate (34) with washer (4) and screw (5).

(6) Replace retaining ring (33).

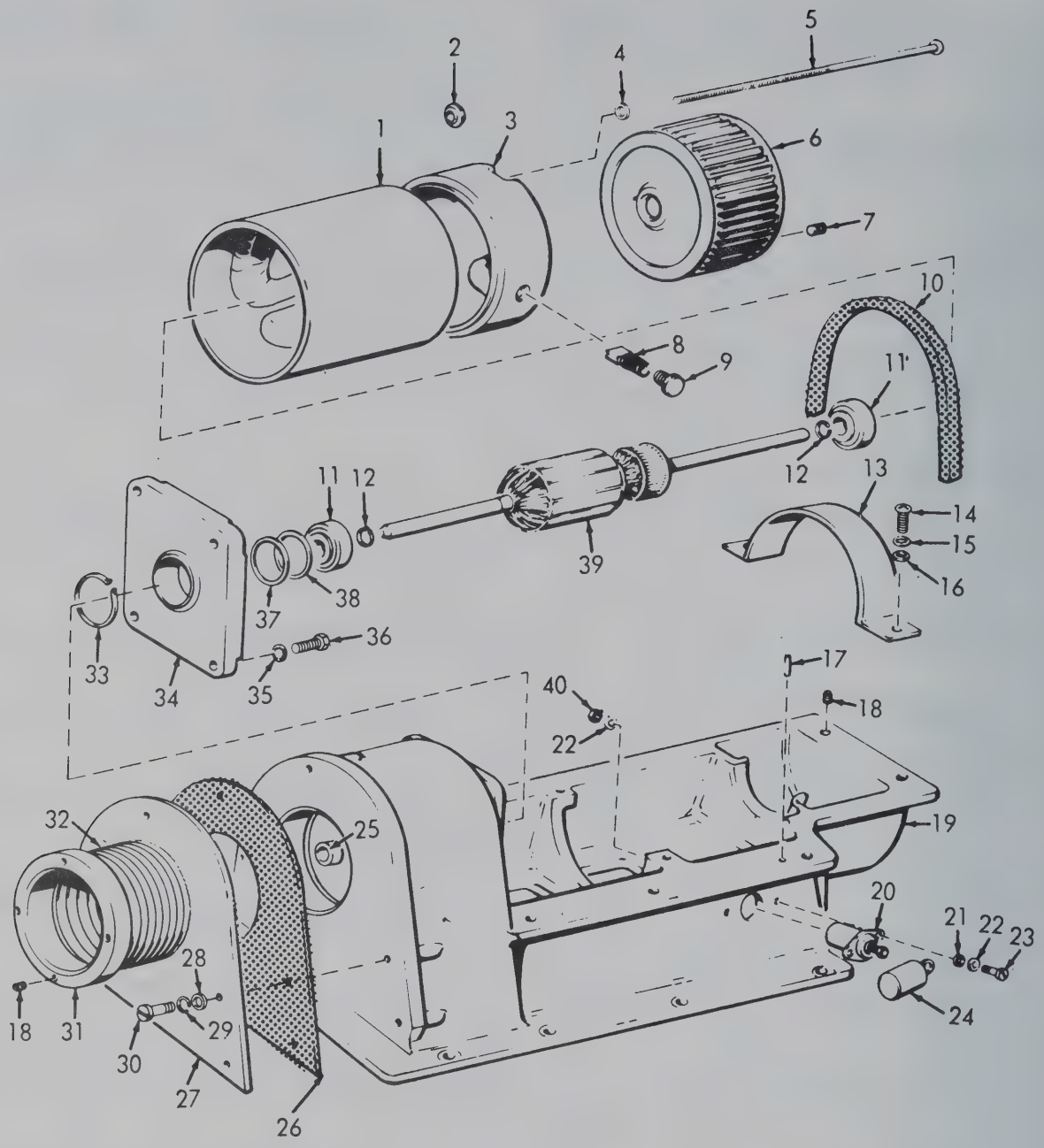
(7) Replace capacitor (20) and diode (24) securing with screw (23), lockwasher (22), washer (21), and nut (40).

(8) Replace impeller (6) and secure with setscrew (7).

(9) Replace brush (8) and secure with cap (9).

(10) Replace the motor assembly in blower chamber (19) and secure with screw (36) and washer (35).

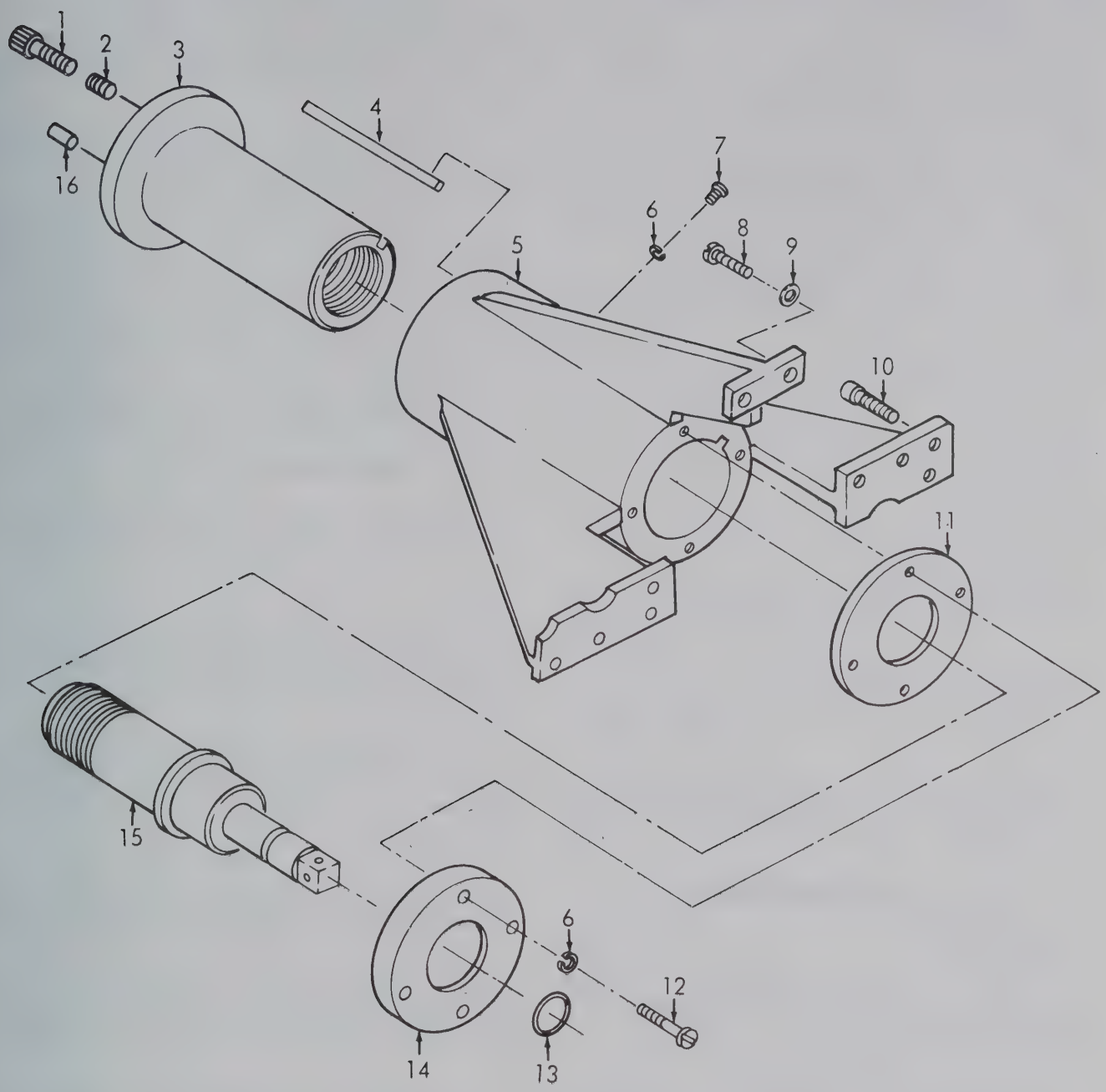
(11) Replace gasket (10) and bracket (13), and secure to blower chamber (19) with washer (16), lockwasher (15), and screws (14).



EL6230-219-35-65

1 Yoke assembly
2 Grommet P/O 13AU
3 Plate
4 Washer P/O 13A6
5 Screw
6 Impeller 13MP10
7 Setscrew
8 Brush 13A9E1
9 Cap
10 Gasket 13MP12
11 Bearing P/O 13A6
12 Retaining ring P/O 13A6
13 Bracket
14 Screw
15 Lockwasher H11
16 Washer
17 Pin 13A8MP4
18 Insert
19 Blower chamber 13MP4
20 Capacitor 13C11
21 Washer
22 Lockwasher 6H2
23 Screw 13H25
24 Diode
25 Seal
26 Gasket 13MP11
27 Plate P/O 13A6
28 Washer
29 Lockwasher
30 Screw
31 Ring P/O 13A6
32 Bellows P/O 13A6
33 Retaining ring
34 Plate
35 Washer 13H11
36 Screw
37 Shim P/O 13A6
38 Shim P/O 13A6
39 Armature 13A9MP1
40 Nut 13H29

Figure 4—16. Blower motor, exploded view.



EL6230-219-35-66

1 Screw H16	9 Washer 10MP3
2 Insert 10A1MP2	10 Screw 10H4
3 Housing 10A1MP1	11 Bearing 10MP1
4 Key 10H3	12 Screw 10MP2
5 Bracket 10MP5	13 Packing 10MP4
6 Washer 10H6	14 Retainer 10A1MP3
7 Screw	15 Screw
8 Screw 13H3	16 Pin

Figure 4—17. Reflector adjustment assembly, exploded view.

4-23. Reflector Adjustment Assembly
(fig. 4—17)

a. Disassembly.

(1) Remove screw (12), washer (6), and retainer (14).

(2) Remove screw (15) from housing (3).

(3) Remove screw (15) and bearing (11).

(4) Remove screw (7), washer (6), and housing (3).

(5) Remove key (4).

(6) Inspect, clean, repair, and lubricate (para 3—20*b*).

b. Reassembly.

(1) Replace key (4).

(2) Replace washer (6) and screw (7).

(3) Replace housing (3) to bracket (5).

(4) Replace bearing (11) and screw (15) in housing (3).

(5) Replace retainer (14) on screw (15) securing with washer (6) and screw (12).

4-24. Control Box C-7163/VSS-1
(fig. 4—18)

a. Disassembly.

(1) Remove six screws (1) holding the control box cover to the case.

CAUTION

Do not use knife or screwdriver to wedge deeply into slot between case and cover. Neoprene seal damage may result if wedge is forced too deep.

(2) Wedge between cover and case, working wedge around perimeter.

(3) Lift control box cover until wires connected to switches can be reached. Tag and remove wires from cover-mounted switches and indicator light; remove control box cover.

(4) Remove grounding screw (2) holding ground leads from connector; remove connector flange retaining screws (3) and washers (4); remove connector (5) while guiding leads through connector opening.

(5) Remove mode selector knob (6) from mode selector switch by removing pin (7).

(6) Unscrew nut (8) and remove washer (9), and indicator (10).

(7) Unscrew nut (11) and remove washer (12) and power switch (13).

(8) Remove screw (14) and washers (15).

(9) Remove mode switch (16).

(10) Clean, inspect, and repair (para 3—20*b*).

b. Reassembly.

(1) Install O-ring and mode switch (16) into cover; apply lubricant (31055—1) to lobe portion of cover; apply pneumatic grease to O-ring.

(2) Position knob (6) and secure with pin (7). Install bushing and switch (13) to cover. Install indicator (10). Twist nut (11) to 35 to 40 inch-pounds.

(3) Terminate wires to mode switch (16); terminate wires to switch (13) and indicator (10).

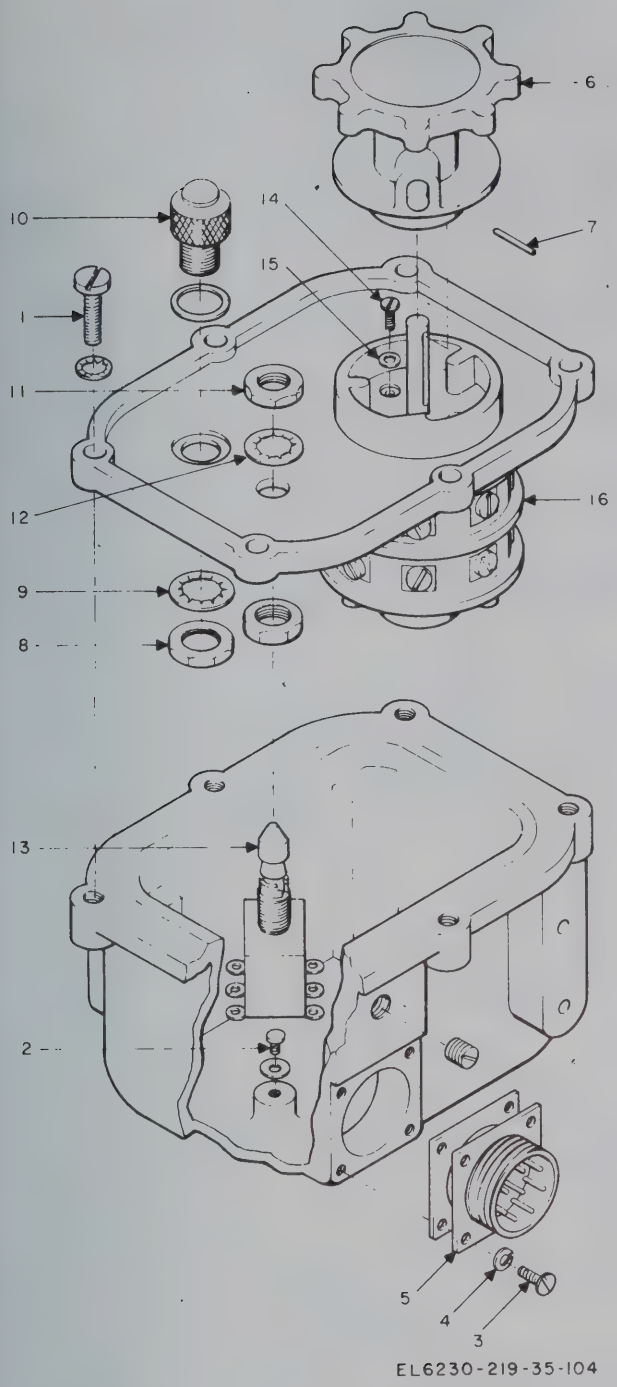
(4) Install cable assembly; mount connector (5) with gasket properly positioned. Terminate ground wires and jumper to ground screw inside of box.

(5) Terminate receptacle wires to switch (13) and mode switch (16).

NOTE

Control box packing should be lightly coated with pneumatic grease before installing the packing.

(6) Lay packing into position on box edges; install cover assembly to box with six screws (1) and washers.



1 Screw H63	9 Washer
2 Screw	10 Indicator 29A6XDS1
3 Screw H65	11 Nut
4 Washer H66	12 Washer
5 Connector 36	13 Switch 23S1
6 Knob 21	14 Screw H47
7 Pin 21MP1	15 Washer 25H41
8 Nut	16 Mode switch 24S2

Figure 4–18. Tank control box, exploded view.

4–25. Control Box C–7164/GSS–14
(fig. 4–19)

a. Disassembly.

(1) Remove 16 screws (1) and washers (2), holding chassis. Lift cover back taking care not to break wiring. Tag and remove wiring to access cover and main power switch.

(2) Remove six screws (3) and washers (4) holding access cover to chassis cover; remove nut (5) holding switch (7) to chassis cover; remove switch (7). Remove mode select knob (9) by driving out pin (8).

(3) Unscrew nut (10) and remove washer (11) and power switch (12).

(4) Unscrew nut (13) and remove washers (14) and indicator (15).

(5) Remove two screws (16) and washers (17, 18, and 19).

(6) Slide mode switch assembly (20) away from cover.

(7) Remove other components and connectors as required for replacement.

(8) Clean, inspect, and repair (para 3–20*b*).

b. Reassembly.

(1) Replace mode switch assembly (20) to access cover with screw (16) and washers (17, 18, and 19).

(2) Replace indicator (15) to access cover with nut (13) and washer (14).

(3) Replace power switch (12) to access cover with nut (10) and washer (11).

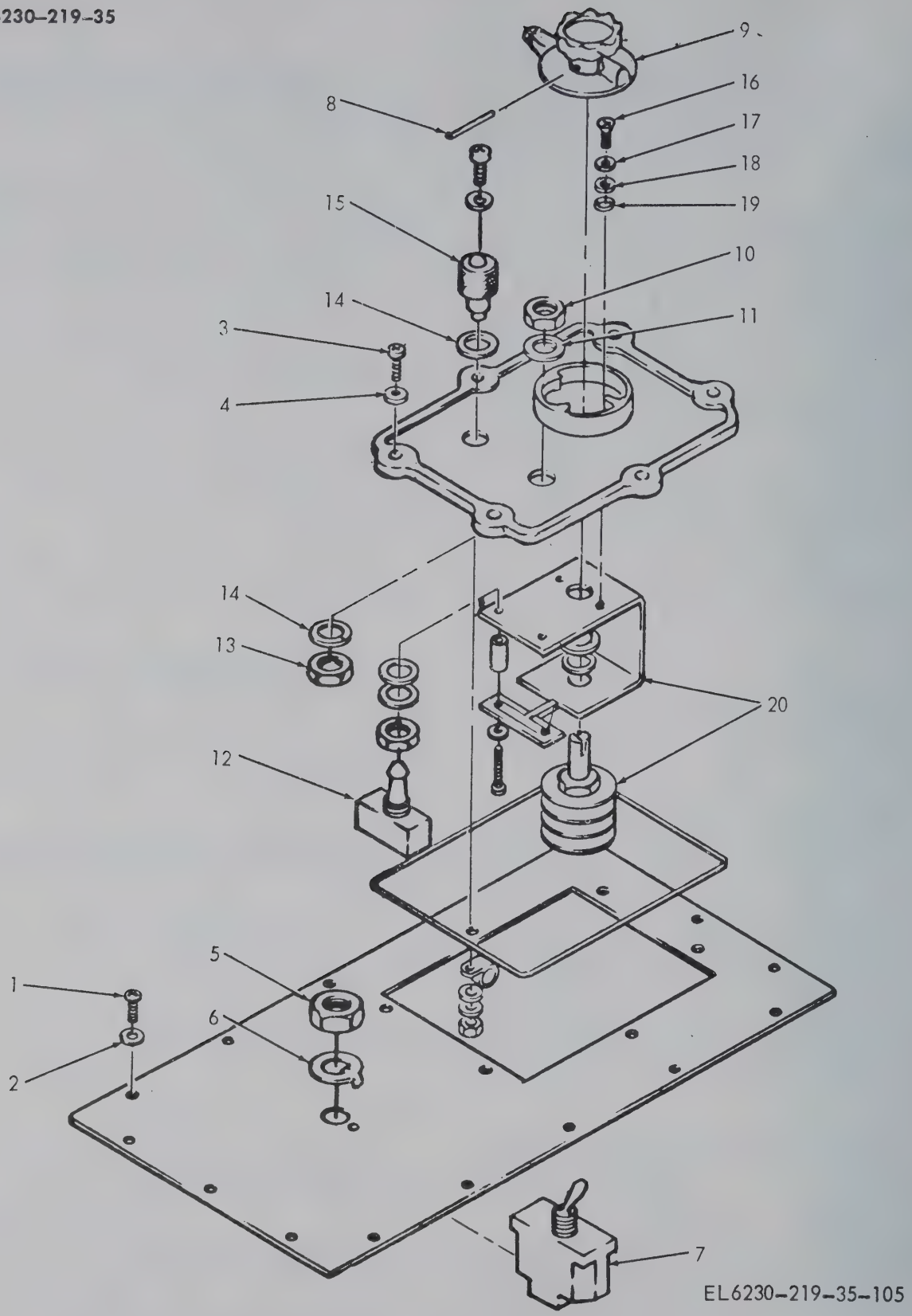
(4) Replace mode select knob (9); secure with pin (8).

(5) Replace access cover to chassis cover with screw (3) and washer (4).

(6) Replace main switch (7) to chassis cover with nut (5) and washer (6).

(7) Replace removed wiring to access cover and main switch (7).

(8) Replace chassis cover with screw (1) and washer (2).



1 Screw H40	6 Washer	11 Washer	16 Screw H47
2 Washer 22H41	7 Switch S3	12 Power switch 23S2	17 Washer 25H41
3 Screw H63	8 Pin 21MP1	13 Nut	18 Washer 25H42
4 Washer H66	9 Mode select knob 21	14 Washer	19 Washer H48
5 Nut	10 Nut	15 Indicator XDS1	20 Mode switch assembly 24

Figure 4-19. Universal control box, exploded view.

4-26. Universal Mount (A) Gearbox
(fig. 4—20, 4—21, and 4—22)

a. Disassembly.

(1) Remove retaining rings (fig. 4—20, 4 and 6) and slide shaft assembly (7) from the gear block housing.

(2) Remove retaining ring (8) and slide the input shaft assembly (9) from the housing.

(3) Remove retaining ring (1), gear cover (2), and modification gear (3) from the housing.

(4) Disassemble shaft assembly (7) by removing retaining ring (fig. 4—21, 1) and sliding washer (2), shims (3), modification bearing (4), helical gear (5), spacer (6), worm gear (7), and thrust bearing (11) from shaft (10).

(5) Disassemble input shaft assembly (fig. 4—20, 9) by removing retaining rings (fig. 4—22, 1 and 3), washers (2 and 4), and sliding ring (5), thrust bearing (6), helical gear (7), and thrust bearing (10) off the shaft (8).

b. Reassembly.

WARNING

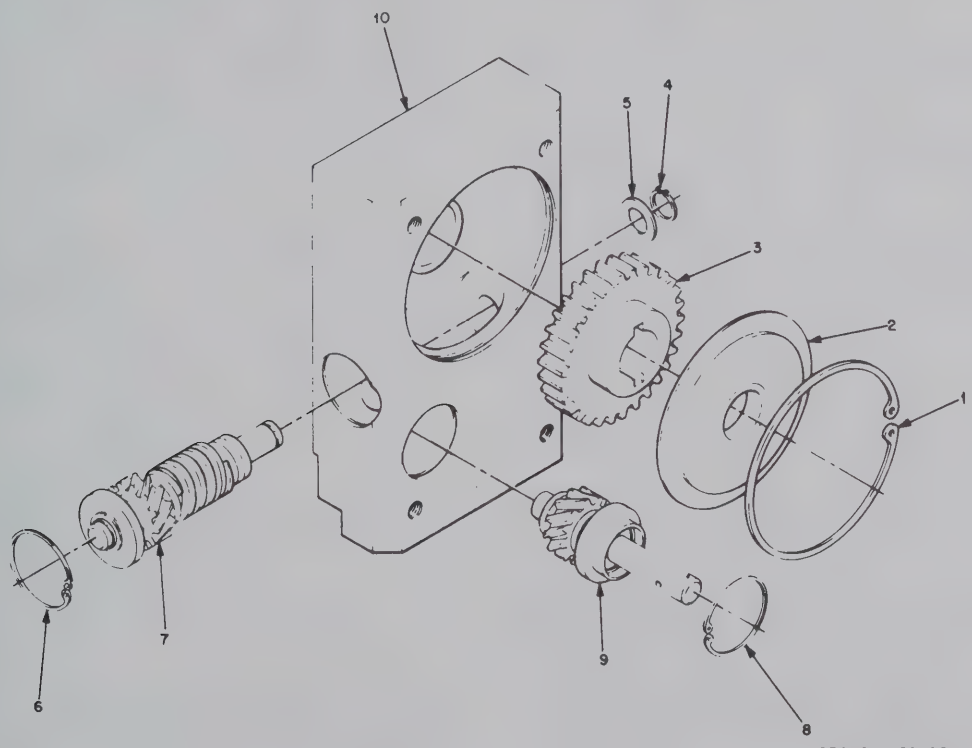
Wear protective goggles when inserting the retaining rings. Failure to do so could result in serious injury if a ring slips.

(1) Apply grease (MIL—G—23827) to all gears and bearings.

(2) Assemble the shaft assembly by placing key (figure 4—21, 9) into the slot in shaft (10) and sliding worm gear (7), thrust bearing (8), spacer (6), helical gear (5), modification bearing (4), shims (3) and washer (2) over shaft (10). Secure with retaining ring (1).

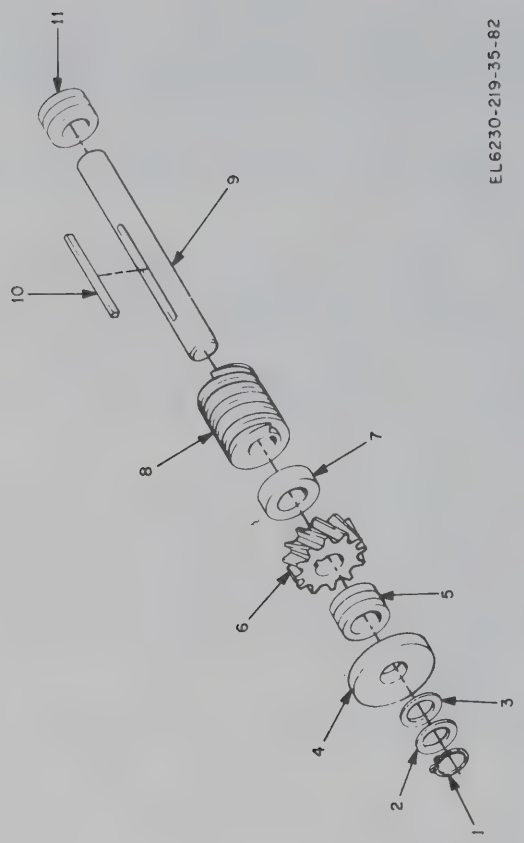
(3) Assemble input shaft assembly (fig. 4—20, 9) by replacing key (fig. 4—22, 9) into shaft (8) and sliding thrust bearing (10), helical gear (7), thrust bearing (6), and retaining ring (5) over shaft (8). Secure with washers (2 and 4) and retaining rings (1 and 2).

(4) Place modification gear (fig. 4—20, 3) and



1 Retaining ring
2 Gear cover
3 Modification gear
4 Retaining ring
5 Washer
6 Retaining ring
7 Worm gear
8 Retaining ring
9 Helical gear
10 Gear housing

Figure 4—20. Elevation gearbox, exploded view.



1 Retaining ring
2 Washer
3 Shim (AR)
4 Modification bearing
5 Thrust bearing
6 Helical gear
7 Spacer
8 Worm gear
9 Thrust bearing
10 Key
11 Thrust bearing

Figure 4—21. Worm gear assembly, exploded view.

gear cover (2) in gear housing (10) and secure them with retaining ring (1).

(5) Slide input shaft assembly (7) into gear housing (10) and secure with retaining ring (8).

(6) Slide shaft assembly (7) into gear housing (10) and secure with washer (5) and retaining rings (4 and 6).

4-27. Relay Panel Assembly (Varo Model 9913)

(fig. 4—1)

a. Disassembly.

(1) Tag, remove, and/or disconnect all wires and cables from the relay panel assembly.

(2) Loosen four screws (11) securing panel assembly (1) to cover (2). Lift panel assembly (1) off of cover (2) and place on clean workbench.

(3) Remove two screws (7) and washers (5) and (4) securing cover (2) to the input filter box on the searchlight subassembly.

(4) Remove four screws (6) and washers (5) and (4) securing spacer (3) to cover (2).

(5) Remove two screws (8) and washers (9) securing circuit breaker (10) to relay assembly (1).

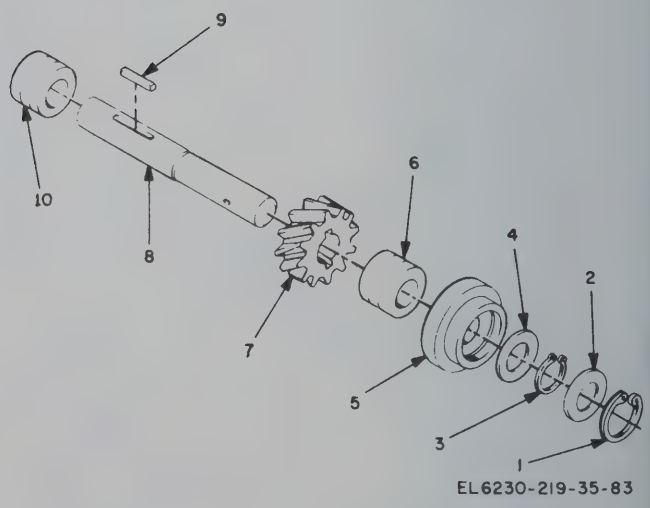
(6) Unplug relays (12) through (18) as required.

b. Reassembly.

(1) Replace relays (12) through (18) as removed in disassembly (*a*(6) above).

(2) Position circuit breaker (10) in its original position on panel assembly (1). Secure with two washers (9) and screws (8).

(3) Replace spacers (3) with washers (4) and (5) and screws (6).



1 Retaining ring
2 Washer
3 Retaining ring
4 Washer
5 Retaining ring
6 Thrust bearing
7 Helical gear
8 Input shaft
9 Key
10 Thrust bearing

Figure 4—22. Input shaft assembly, exploded view.

(4) Position cover (2) in its original position on the input filter box. Secure with two washers (4), washers (5), and screws (7).

(5) Position panel assembly (1) in its original position on cover (2). Secure with four screws (11).

(6) Reconnect all wires and cables as coded in removal (*a*(1) above).

4-28. Relay Panel Assembly (Varo Model 9922 and Melpar Model F40015)

(fig. 4-2)

a. Disassembly.

(1) Tag, remove, and/or disconnect all wires and plugs from the relay panel assembly.

(2) Remove two screws (11) and washers (10) that secure cover (7) to the searchlight subassembly. Place cover (7) on clean workbench.

(3) Remove four screws (3), eight washers (4), and four nuts (8) that secure relay assembly (2) to cover (7). Lift relay assembly (2) off of cover (7).

(4) Remove two screws (12), four washers (10), and two nuts (9) that secure circuit breaker (1) to cover (7). Lift circuit breaker (1) off of cover (7).

(5) Remove diode (5) in the manner prescribed in paragraph 3-40.

(6) Remove ground connection screw (3) and washers (6) and (4).

b. Reassembly.

(1) Replace washers (4) and (6) and screw (3) in the ground connection receptacle.

(2) Replace diode (5) in the manner prescribed in paragraph 3-40.

(3) Position circuit breaker (1) in its original position on cover (7). Secure circuit breaker (1) to cover (7) with two nuts (9), four washers (10), and two screws (12).

(4) Position relay assembly (2) on its original position on cover (7). Secure relay assembly (2) to cover (7) with four nuts (8), eight washers (4) and four screws (3).

(5) Place cover (7) in its original position on the searchlight subassembly and secure with two screws (11) and washers (10).

(6) Replace all wires and cables as coded in removal (*a*(1) above).

4-29. Converter Assembly (ITT Model 6484)

Several parts are used on the converter assembly that are sealed with sealing compound (fig. 4-23, 4-24, and 4-25). Dissolve this compound with solvent after removal of these parts. Also be sure to add new sealing compound when replacing parts.

a. Component Plate and Heat Sink Removal (fig. 4-24 and 4-25).

(1) Tag (fig. 4-23) four terminal lugs (3) to correspond to positions on terminal board (9). Remove four screws (1) and four lockwashers (2), and lift four terminal lugs (3) from terminal board (9).

(2) Remove one screw (4) and lockwasher (5), and lift terminal lug (6) from terminal board (9).

(3) Remove four screws (8) and lift terminal board (9) from heat sink assembly (15).

(4) Remove one screw (10), two screws (11), and two screws (12), and lift component plate assembly (13) from heat sink assembly (15) and base plate (55).

(5) Remove two screws (14) and lift heat sink assembly (15) from base plate (55).

b. Component Plate and Heat Sink Replacement.

(1) Align the two holes near front of base plate (55) with the two threaded holes in the bottom of heat sink assembly (15). Insert two screws (14) through the holes of the base plate into the threaded holes on heat sink assembly (15) and tighten.

(2) Align the two holes near center of base plate (55) with the two tapped holes in the bottom of component plate assembly (13). Insert two screws (12) through the holes of the base plate

assembly into the threaded holes of component plate assembly (13). Do not tighten. Align the two threaded holes of the component plate assembly with the two holes of heat sink assembly (15). Insert two screws (11) through the holes of heat sink assembly (15) into tapped holes on component plate assembly (13). Do not tighten. Insert screw (10) through the hole near center top of heat sink assembly (15) into the threaded hole in the component plate assembly. Tighten screws (10), (11), and (12).

(3) Align the four holes in terminal board (9) with the four threaded holes on top of heat sink assembly (15). Spread sealing compound grade C (7) on threads of four machine screws (8). Insert four machine screws (8) through the holes in terminal board (9) into the threaded holes of heat sink assembly (15) and tighten.

(4) Place terminal lug (6) in the correct position on terminal board (9). Insert screw (4) through lockwasher (5), terminal lug (6) and the threaded hole in terminal board (9). Tighten screw (4).

(5) Place four tagged terminal lugs (3) in the correct position on terminal block (9). Insert four screws (1) through four lockwashers (2), four terminal lugs (3) and the threaded holes in terminal board (9). Tighten screws (1).

c. Transformer (T2) Removal (fig. 4—23). Tag wires soldered to transformer (54) corresponding to terminal markings on transformer (54). Remove four nuts (52) and four screws (53), and lift transformer (54) from base plate (55).

d. Transformer (T2) Replacement. Align the four mounting holes of transformer (54) with the four holes in base plate (55). Insert four screws (53) through mounting holes of transformer (54) and base plate (55). Thread four plain hexagon nuts (52) on screws (53) and tighten. Solder tagged wires to corresponding terminals of transformer (54).

e. Transformer (T1) Removal (fig. 4—24). Tag lead of resistor (45) and wires soldered to transformer (49) corresponding to terminal markings on transformer (49). Unsolder lead of resistor (45) and wires from transformer (49). Unsolder lead of resistor (45) and wires from transformer (49). Remove one nut (46), washer (47), screw (48) and lift transformer (49) from component plate assembly (54).

f. Transformer (T1) Replacement. Align hole in transformer (49) with hole in component plate (54). Insert screw (48) through washer (47), through transformer (49), through component plate (54) and nut (46). Solder leads.

4–30. Converter Assembly (Varo Model 9912)

(fig. 4—5)

a. Disassembly.

(1) Tag nine lugs (1) to correspond to positions on terminal board (2).

(2) Remove six screws (3) and six lockwashers (4) from terminal board (2). Remove tagged wires.

(3) Remove four screws (5), four nuts (6), retaining plate (7), and two washers (8) securing terminal board (2) to component plate (9).

(4) On printed circuit board (10), tag and disconnect the wires.

(5) Remove four screws (11), eight washers (12), eight lockwashers (13), and clamp (14). Lift printed circuit board (10) off of component plate (9).

(6) Remove printed circuit board (10) from chassis (15).

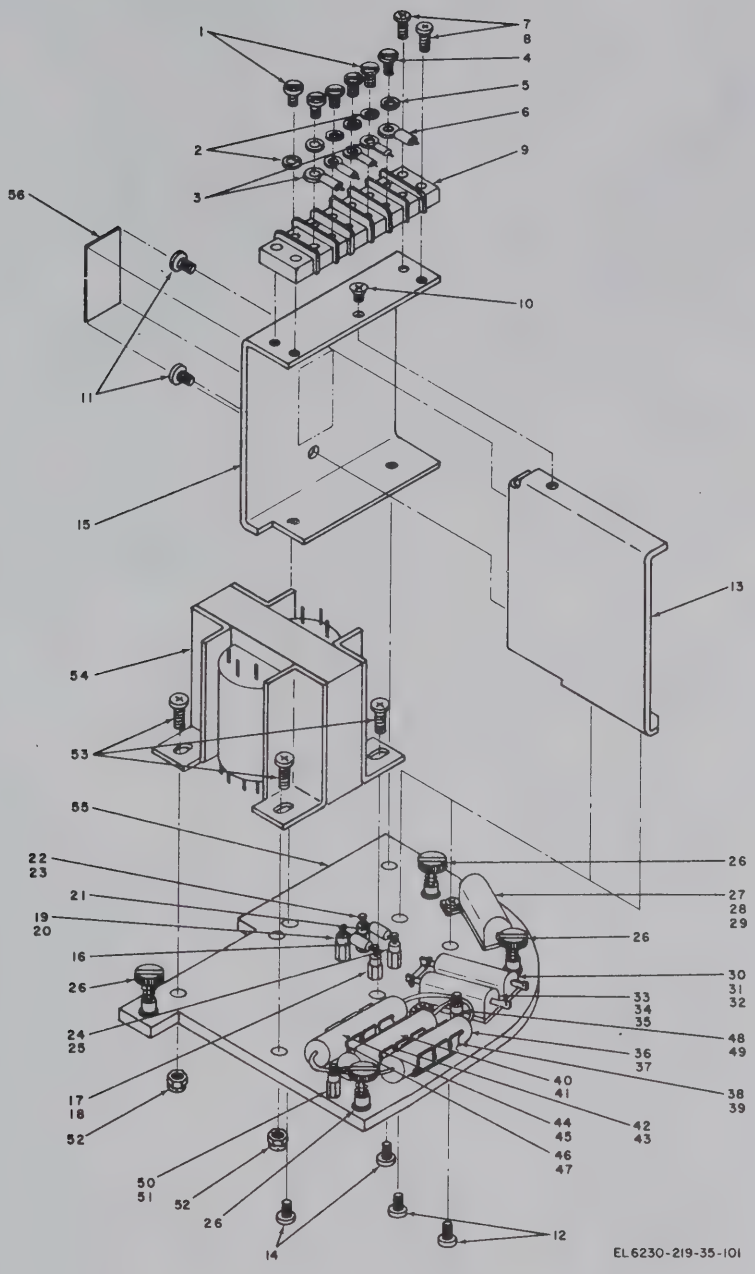
(7) Remove three nuts (16), washers (17), nut (18), and washer (19) from component plate (9).

(8) Remove two screws (20) that secure bracket (22) to component plate (9).

(9) Remove two screws (21) that secure bracket (22) to component plate (49).

(10) Remove four screws (23) that secure heat sink (24) to component plate (9).

(11) Remove three screws (25), lockwashers (26), and flat washers (27) that secure heat sink (67) to component plate (9). Remove heat sinks (24) and (67) from component plate (9).

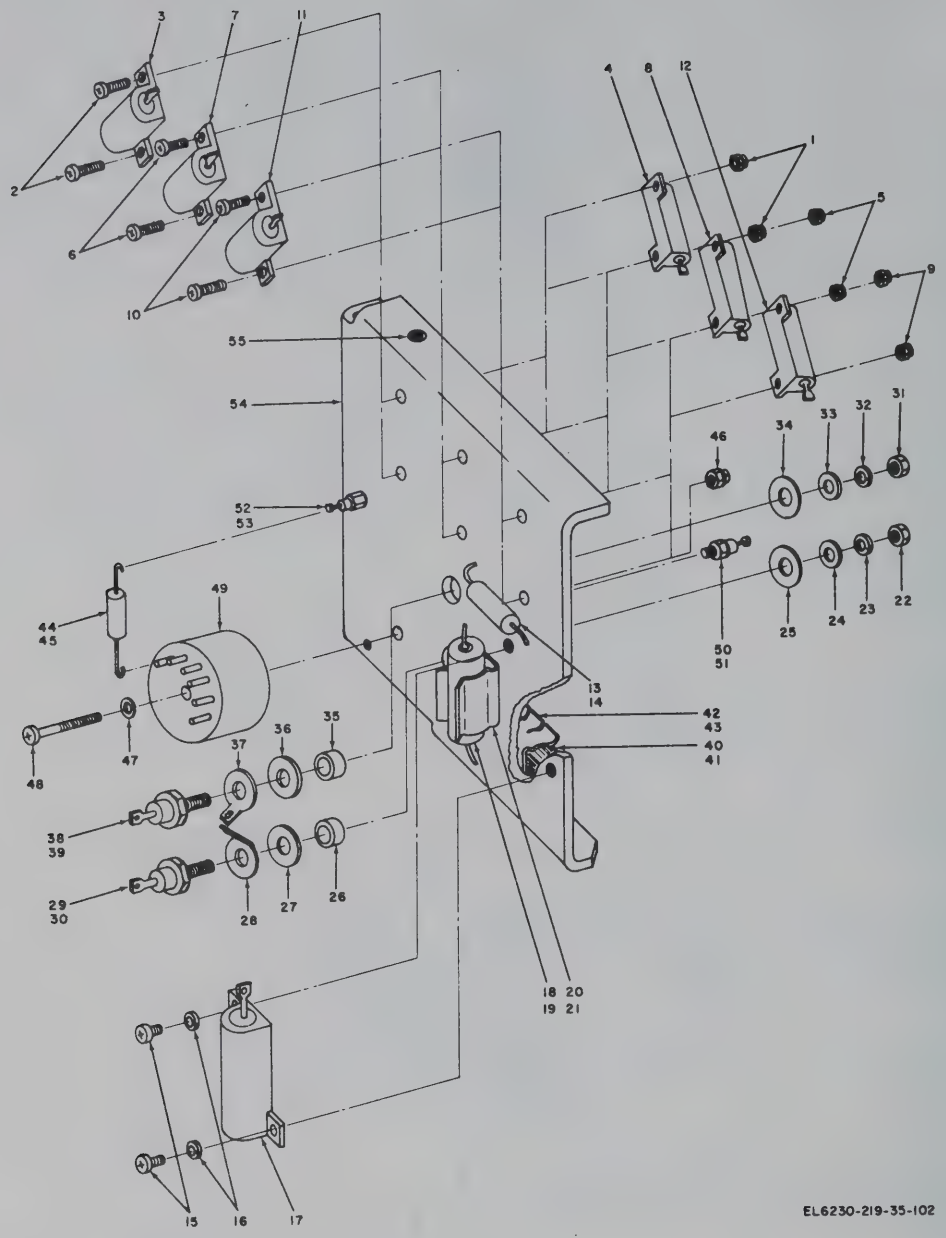


NOTE

All reference designations are preceded by 38.

1 Screw P/O TB1
2 Lockwasher H2
3 Terminal lug A4H1
4 Screw P/O TB1
5 Lockwasher H2
6 Terminal lug A4H2
7 Sealing compound grade C
8 Screw H1
9 Terminal board TB1
10 Screw H3
11 Screw H4
12 Screw H5
13 Component plate assembly A1
14 Screw H5
15 Heat sink assembly A2
16 Resistor R11
17 Sealing compound grade C
18 Terminal stud E5
19 Sealing compound grade C
20 Terminal stud E6
21 Resistor R13
22 Sealing compound grade C
23 Terminal stud E7
24 Sealing compound grade C
25 Terminal stud E8
26 Fastener assembly A4A1
27 Screw H7
28 Washer H8
29 Resistor R10
30 Screw H7
31 Washer H8
32 Resistor R14
33 Screw H7
34 Washer H8
35 Resistor R12
36 Insulation tubing MP2
37 Capacitor C5
38 Rivet A4H2
39 Clip A4H1
40 Insulation tubing MP2
41 Capacitor C4
42 Rivet A4H2
43 Clip A4H1
44 Insulation tubing MP2
45 Capacitor C3
46 Rivet A4H2
47 Clip
48 Sealing compound grade C
49 Terminal stud E4
50 Sealing compound grade C
51 Terminal stud E3
52 Nut H9
53 Screw H6
54 Transformer T2
55 Base plate A4
56 Plate, identification MP1

Figure 4—23. Converter assembly (ITT model 6484).

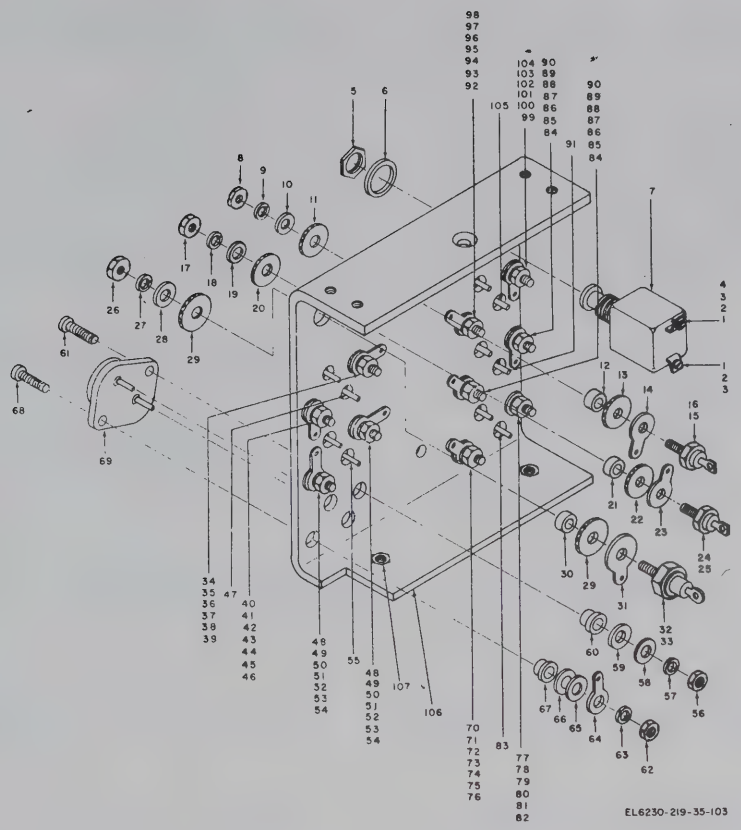


NOTE

All reference designations are preceded by 38.

1 Nut A1H2
2 Screw A1H1
3 Resistor A1R4
4 Resistor A1R9
5 Nut A1H2
6 Screw A1H1
7 Resistor A1R3
8 Resistor A1R8
9 Nut A1H2
10 Screw A1H1
11 Resistor A1R2
12 Resistor A1R7
13 Insulation tubing A1MP1
14 Resistor A1R6
15 Screw A1H3
16 Washer A1H4
17 Resistor A1R5
18 Insulation tubing A1MP1
19 Capacitor A1C1
20 Rivet A1A1H2
21 Clip A1A1H1
22 Nut A1H13
23 Washer A1H12
24 Washer A1H11
25 Insulator A1H10
26 Bushing A1H8
27 Insulator A1H10
28 Terminal lug A1H9
29 Sealing compound grade E
30 Semiconductor device A1CR2
31 Nut A1H13
32 Washer A1H12
33 Washer A1H11
34 Insulator A1H10
35 Bushing A1H8
36 Insulator A1H10
37 Terminal lug A1H9
38 Sealing compound grade E
39 Semiconductor device A1CR3
40 Insulation tubing A1MP1
41 Capacitor A1C2
42 Rivet A1A1H4
43 Clip A1A1H3
44 Insulation tubing A1MP1
45 Resistor A1R1
46 Nut A1H7
47 Washer A1H6
48 Screw A1H5
49 Transformer A1T1
50 Sealing compound grade
51 Terminal stud A1E2
52 Sealing compound grade
53 Terminal stud A1E1
54 Component plate A1A1
55 Insert A1A1H5

Figure 4—24. Converter assembly (ITT model 6484), component plate assembly.



NOTE

All reference designations are preceded by 38.

1 Screw P/O A2CB1
2 Washer P/O A2CB1
3 Terminal lug A3H1
4 Terminal lug A3H2
5 Nut P/O A2CB1
6 Washer P/O A2CB1
7 Circuit breaker A2CB1
8 Nut P/O A2CR1
9 Washer P/O A2CR1
10 Washer P/O A2CR1
11 Insulator P/O A2CR1
12 Bushing A2H3
13 Insulator P/O A2CR1
14 Terminal lug P/O A2CR1
15 Sealing compound grade E
16 Semiconductor device A2CR1
17 Nut P/O A2CR4
18 Washer P/O A2CR4
19 Washer P/O A2CR4
20 Insulator P/O A2CR4
21 Bushing A2H3
22 Insulator P/O A2CR4
23 Terminal lug P/O A2CR4
24 Sealing component grade E
25 Semiconductor device A2CR4
26 Nut A2H2
27 Washer A2H11
28 Washer A2H10
29 Insulator A2H8
30 Bushing A2H9
31 Terminal lug A2H1
32 Sealing compound grade E
33 Semiconductor device A2CR5
34 Nut A2H5
35 Washer lock A2H4
36 Terminal lug A3H3
37 Bushing A2H7
38 Insulator A2H6
39 Screw A2H2
40 Nut A2H5
41 Washer A2H4
42 Terminal lug A3H4
43 Washer A2H3
44 Bushing A2H7
45 Insulator A2H6
46 Screw A2H2
47 Transistor A2Q1
48 Nut A2H5
49 Washer A2H4
50 Terminal lug A3H4
51 Washer A2H3
52 Bushing A2H7
53 Insulator A2H6
54 Screw A2H2
55 Transistor A2Q2
56 Nut A2H5
57 Washer A2H4
58 Washer A2H3
59 Bushing A2H7
60 Insulator A2H6
61 Screw A2H2
62 Nut A2H5
63 Washer A2H4
64 Terminal lug A3H4
65 Washer A2H3
66 Bushing A2H7
67 Insulator A2H6
68 Screw A2H2
69 Transistor A2Q3
70 Nut A2H5
71 Washer A2H4
72 Terminal lug A3H4
73 Washer A2H3
74 Bushing A2H7
75 Insulator A2H6
76 Screw A2H2
77 Nut A2H5
78 Washer A2H4
79 Washer A2H3
80 Bushing A2H7
81 Insulator A2H6
82 Screw A2H2
83 Transistor A2Q6
84 Nut A2H5
85 Washer A2H4
86 Terminal lug A3H4
87 Washer A2H3
88 Bushing A2H7
89 Insulator A2H6
90 Screw A2H2
91 Transistor A2Q5
92 Nut A2H5
93 Washer A2H4
94 Terminal lug A3H4
95 Washer A2H3
96 Bushing A2H7
97 Insulator A2H6
98 Screw A2H2
99 Nut A2H5
100 Washer A2H4
101 Terminal lug A3H3
102 Bushing A2H7
103 Insulator A2H6
104 Screw A2H2
105 Transistor A2Q4
106 Heat sink subassembly A2A1
107 Insert A2A1H1

Figure 4–25. Converter assembly (ITT model 6484), heat sink assembly.

(12) Lift component plate (9) straight up.

(13) Tag and remove the wires connected to diodes (33) and rectifiers (34).

(14) Remove two screws (35), two lockwashers (36), and two flat washers (37) securing wires to heat sinks (24) and (67). Remove wires from heat sinks.

(15) Tag and remove wires connected to two diodes (33) and two rectifiers (34) on heat sinks (24) and (67).

(16) Remove locknuts (29) and nuts (28) and remove rectifiers (34) from heat sinks (24 and 67).

(17) Remove nuts (30), lockwashers (31), and flat washers (32) from diodes (33) and remove diodes (33) from heat sink (24) and heat sink (67).

(18) Tag and disconnect wires connected to resistor (38).

(19) Remove two fiber washers (39), bushing (40), and fiber washer (41).

(20) Lift resistor (38) off of standoff (42).

(21) Remove fiber washer (39), bushing (40), fiber washer (41), and standoff (42).

(22) Tag and remove the wires connected to two diodes (43).

(23) Remove two screws (44), one insert (45), two washers (46), two inserts (50), insulator (51), and nuts (47) securing bracket (48) to plate (49). Lift bracket (48) off of plate (49).

(24) Tag and remove wires connected to transformer (52).

(25) Remove six screws (53) that secure transformer (52) to plate (49). Lift transformer (52) off of plate (49).

(26) Tag and remove wires connected to capacitor (54).

(27) Remove four screws (55), washers (56), and nuts (57) that secure capacitor (54) to plate (49).

(28) Tag and remove wires connected to capacitor (58).

(29) Remove two screws (59), nuts (60), and washers (61) securing capacitor (58) to plate (49). Lift capacitor (58) off of plate (49).

(30) Tag and disconnect wires on inductor (62).

(31) Remove two screws (63) and plate (64) securing inductor (62) to plate (49).

(32) Lift inductor (62) and plate (64) off of plate (49).

(33) Remove screws (65) securing three standoffs (66) to plate (49).

(34) Remove standoffs (66) from plate (49).

(35) Clean, inspect, and repair (para 3—20*b*).

b. Reassembly.

(1) Secure three standoffs (66) to plate (49) with screws (65).

(2) Place inductor (62) and plate (64) on plate (49). Secure with screws (63).

(3) Reconnect wires to inductor (62) as coded in removal.

(4) Place capacitor (58) on plate (49) secure with two screws (59), nuts (60), and washers (61).

(5) Reconnect wires to capacitor (58) as coded in removal.

(6) Place capacitor (54) on plate (49). Secure with four screws (55), washers (56), and nuts (57).

(7) Reconnect wires to capacitor (54) as coded in removal.

(8) Place transformer (52) on plate (49). Secure with six screws (53).

(9) Reconnect wires to transformer (52) as coded in removal.

(10) Place bracket (48) on plate (49). Secure with two screws (44), insert (45), two washers

(46), two inserts (50), insulator (51), and nuts (47).

(11) Reconnect wires to two diodes (43) as coded in removal.

(12) Insert standoff (42) into plate (49). Place bushing (40), fiber washer (39), and resistor (38) over standoff (42).

(13) Reconnect wires to resistor (38) as coded in removal.

(14) Reconnect wires to two diodes (33) and two rectifiers (34) on heat sinks (24) and (67) as coded in removal.

(15) Reconnect wires to heat sinks (24) and (67) as coded in removal. Secure with two screws (35).

(16) Reconnect wires to diodes (33) and rectifiers (34) as coded in removal.

(17) Fit component plate (9) on standoffs (66).

(18) Position heat sink (24) on component plate (9). Secure heat sink (24) to component plate (9) with three screws (25), lock-washers (26), and flat washers (27).

(19) Position heat sink (24) on component plate (9) and secure with four screws (23).

(20) Position bracket (22) on component plate (9) and secure bottom of bracket (22) with two screws (21).

(21) Secure top of bracket (22) to component plate (9) with two screws (20).

(22) Replace three nuts (16), washers (17), nut (18), and washer (19) on printed circuit board (10).

(23) Replace printed circuit board (10) on chassis (15).

(24) Place printed circuit board (10) on component plate (9) and secure with four screws (11), eight washers (12), eight lock-washers (13), and cable clamp (14).

(25) Reconnect wires to printed circuit board (10) as coded in removal.

(26) Place terminal board (2) on component plate (9). Secure with four screws (5), nuts (6), retaining plate (7), and washers (8).

(27) Replace wires on terminal board (2) as coded in removal. Secure with six screws (3) and lockwashers (4).

4–31. Converter Assembly (Melpar Model F50001)

(fig. 4–6)

a. Disassembly.

(1) Tag and disconnect eight wires connected to terminal board (1).

(2) Remove four screws (2), washers (3), lockwashers (4), and nuts (5) securing terminal board (1) to component plate (6).

(3) Tag and disconnect five wires from printed circuit board (7).

(4) Remove four screws (8), four washers (9), four lockwashers (10), four insulators (11), and clamp (12) securing printed circuit board (7) and protective plate (13) to component plate (6).

(5) Remove screw (14), flat washer (15), and lockwasher (16) securing component plate (6) to standoff (17).

(6) Remove two screws (18), two lockwashers (19), and two flat washers (20) securing component plate (6) to bracket (21).

(7) Remove screw (22), lockwasher (23), and flat washer (24) securing component plate (6) to standoff (25).

(8) Remove two screws (26) securing component plate (6) to bracket (27).

(9) Tag and disconnect the two wires connected to resistor (28).

(10) Remove screw (29), flat washer (30), lockwasher (31), nut (32), and two insulators (33) securing resistor (28) to component plate (6) and bottom plate (34).

(11) Remove two nuts (39) and two lockwashers (40) securing two diodes (41) to component plate (6).

(12) Lift component plate (6) straight up. At the same time feed chassis wiring down through rubber grommets (42) and (43).

(13) Tag and disconnect the wires connected to two zener diodes (44).

(14) Remove six screws (46), two screws (47), eight spacers (48), eight spacers (49), eight flat washers (50), eight lockwashers (51), and eight nuts (52) securing two heat sinks (45) to component plate (6). Remove heat sinks (45) from component plate (6).

(15) Tag and disconnect the wires attached to inductor (53).

(16) Remove two screws (54) that secure inductor (53) to bottom plate (34).

(17) Remove two screws (55), two flat washers (56), and two lockwashers (57) that secure inductor (53) to bottom plate (34). Lift inductor (53) off of bottom plate (34).

(18) Tag and disconnect the wires attached to capacitor (58).

(19) Remove two screws (35), two flat washers (36), two lockwashers (37), and two nuts (38) securing capacitor (58) to bottom plate (34). Lift capacitor (58) off of bottom plate (34).

(20) Remove screw (59), screw (60), flat washer (61), and lockwasher (62) that secure bracket (63) to bottom plate (34). Remove bracket (27) from bottom plate (34). This exposes capacitor (64).

(21) Remove two screws (60), two flat washers (61), two lockwashers (62), and two nuts (65) securing capacitor (64) to bottom plate (34). Lift capacitor (64) off of bottom plate (34).

(22) Tag and disconnect the wires attached to transformer (66).

(23) Remove screw (67), three screws (68), three flat washers (69), and three lockwashers (70) that secure transformer (66) to bottom plate (34). Lift transformer (66) off of bottom plate (34).

(24) Clean, inspect, and repair (para 3—20*b*).

b. Reassembly.

(1) Position transformer (66) on bottom plate (34). Secure with three lockwashers (70), three flat washers (69), three screws (68), and screw (67).

(2) Reconnect the wires to transformer (66) as coded in removal.

(3) Position capacitor (64) on bottom plate (34). Secure with two nuts (65), two lockwashers (62), two flat washers (61), and two screws (60).

(4) Position bracket (27) on bottom plate (34). Secure with lockwasher (62), flat washer (61), screw (60), and screw (59).

(5) Position capacitor (58) on bottom plate (34). Secure with two nuts (38), two lockwashers (37), two flat washers (36), and two screws (35).

(6) Reconnect the wires to capacitor (58) as coded in removal.

(7) Position inductor (53) on bottom plate (34). Secure with two lockwashers (57), two flat washers (56), and two screws (55).

(8) Replace two screws (54) that secure inductor (53) to bottom plate (34).

(9) Reconnect the wires to inductor (53) as coded in removal.

(10) Position heat sinks (45) on component plate (6) and secure with eight nuts (52), eight lockwashers (51), eight flat washers (50), eight spacers (49), eight spacers (48), two screws (47), and six screws (46).

(11) Reconnect the wires to two zener diodes (44) as coded in removal.

(12) Position component plate (6) on top of standoff (17), bracket (21), standoff (25), and bracket (63).

(13) Feed chassis wires up through rubber grommets (42) and (43).

(14) Position two diodes (41) on component

plate (6). Secure with two lockwashers (40) and two nuts (39).

(15) Position resistor (28) between component plate (6) and bottom plate (34). Run screw (29) from bottom plate (34) up through resistor (28) until the end of screw (29) protrudes above component plate (6). Secure resistor (28) with two insulators (33), nut (32), lockwasher (31), and flat washer (30).

(16) Reconnect two wires to resistor (28) as coded in removal.

(17) Replace two screws (26); tighten and secure component plate (6) to bracket (27).

(18) Replace flat washer (24), lockwasher (23), and screw (22); tighten and secure component plate (6) to standoff (25).

(19) Replace two flat washers (20), two lockwashers (19), and two screws (18); tighten and secure component plate (6) to bracket (21).

(20) Replace lockwasher (16), flat washer (15), and screw (14); tighten and secure component plate (6) to standoff (17).

(21) Position protective plate (13) and printed circuit board (7) on component plate (6). Secure with clamp (12), four insulators (11), four lockwashers (10), four washers (9), and four screws (8).

(22) Reconnect five wires to printed circuit board (7) as coded in removal.

(23) Position terminal board (1) on component plate (6). Secure with four nuts (5), four lockwashers (4), four washers (3), and four screws (2).

(24) Reconnect eight wires to terminal board (1) as coded in removal.

4–32. Converter Assembly (Varo Model 9924)

(fig. 4–8)

a. Disassembly.

(1) Tag and disconnect the wires attached to terminal board (1).

(2) Remove four screws (2) and one spacer (3) securing terminal board (1) to component plate (4).

(3) Tag and disconnect the wires attached to printed circuit board (5).

(4) Remove four screws (6), eight flat washers (7), four lockwashers (8), four inserts (9), and four locknuts (10) that secure printed circuit board (5) to component plate (4). Removal clamp (11).

(5) Remove seven screws (12) that secure heat sinks (13) and (14) on component plate (4). Gently lower two heat sinks (13) and (14) to a resting position.

(6) Remove locknut (19) and washer (20) securing component plate (4) to the top of resistor (21).

(7) Remove nut (22) and washer (23) securing component plate (4) to standoff (24).

(8) Remove screw (25) and screw (26) securing component plate (4) to bracket (27).

(9) Remove two locknuts (19) and two washers (20) that secure component plate (4) to two standoffs (28).

(10) Remove nut (29) and washer (30) securing diode (31) to component plate (4). Tag and disconnect the wiring.

(11) Lift component plate (4) straight up and off of the chassis.

(12) Tag and disconnect the wires attached to heat sinks (13) and (14). Remove heat sinks (13) and (14).

(13) Remove two screws (26) that secure bracket (27) to bottom plate (32). Take bracket (27) off of bottom plate (32).

(14) Tag and disconnect the wires attached to inductor (33).

(15) Remove from bottom plate (32) three screws (34) that secure inductor (33) and spacer (35). Lift inductor (33) off of bottom plate (32).

(16) Tag and disconnect the two wires connected to resistor (21).

(17) Remove bolt (36) from the bottom of bottom plate (32). Remove resistor (21) from the chassis.

(18) Tag and disconnect the wires attached to capacitor (44). Remove four locknuts (40), four washers (41), and four screws (42) that secure clamps (43) to bottom plate (32). Remove two clamps (43) and capacitor (44).

(19) Tag and disconnect the wires attached to transformer (45).

(20) Remove four screws (46) that secure transformer (45) to bottom plate (32).

(21) Tag and disconnect the wires attached to two capacitors (47), and remove nuts (48), washers (49), and screws (50) securing the capacitors to component plate (4).

(22) Remove two nuts (51) securing two diodes (52) to bracket (53). Remove diodes (52).

(23) Remove two screws (54) and spacer (55) securing bracket (53) to bottom plate (32). Remove bracket (53) from bottom plate (32).

(24) Tag and disconnect the wires attached to two resistors (61). Remove four screws (62) and nuts (63) securing resistors (61) to component plate (4).

(25) Clean, inspect, and repair (para 3—20*b*).

b. Reassembly.

(1) Reconnect wires to two resistors (61) as coded in removal.

(2) Secure resistors (61) to component plate (4) with four screws (62) and four nuts (63).

(3) Position bracket (53) on bottom plate (32) and secure with two screws (54) and spacer (55).

(4) Insert two diodes (52) into bracket (53) and secure with two nuts (51).

(5) Position transformer (45) on bottom plate (32). Secure with four screws (46).

(6) Reconnect the wires to transformer (45) as coded in removal.

(7) Position capacitor (44) on bottom plate (32). Secure with two clamps (43), four screws (42), four washers (41), and four locknuts (40).

(8) Position resistor (21) on bottom plate (32) and run bolt (36) from the bottom of bottom plate (32) up through the center of resistor (21).

(9) Reconnect the wires to resistor (21) as coded in removal.

(10) Place inductor (33) and spacer (35) on bottom plate (32). Secure inductor (33) and spacer (35) to bottom plate (32) with three screws (34).

(11) Reconnect the wires to inductor (33) as coded in removal.

(12) Place bracket (27) on bottom plate (32). Secure with two screws (26).

(13) Reconnect the wires to heat sinks (13) and (14) as coded in removal.

(14) Place component plate (4) on the top of standoffs (24) and (28). Secure component plate (4) to standoff (28) with two locknuts (19) and two washers (20).

(15) Position two diodes (31) on component plate (4) and secure with two nuts (29) and two washers (30).

(16) Secure component plate (4) to bracket (27) with screw (25) and nut (26).

(17) Secure component plate (4) to standoff (24) with nut (22) and washer (23).

(18) Secure component plate (4) to the top of resistor (21) with locknut (19) and washer (20).

(19) Position heat sinks (13) and (14) on component plate (4). Secure with seven screws (12).

(20) Position printed circuit board (5) on component plate (4). Secure with four locknuts (10), four inserts (9), four lockwashers (8), eight flat washers (7), and four screws (6).

(21) Reconnect the wires to printed circuit board (5) as coded in removal.

(22) Place terminal board (1) on component plate (4). Secure with one spacer (3) and four screws (2).

(23) Reconnect the wires to terminal board (1) as coded in removal.

(24) Position two capacitors (47) on the bottom of component plate (4) and secure with screws (50), washers (49), and nuts (48). Reconnect the wires as coded in removal.

(25) Position two diodes (31) on component plate (4). Attach washers (30) on the tagged wires, and diodes to component plate (4).

4–33. Converter Assembly (Varo Model 9948)

(fig. 4–9)

a. Disassembly.

(1) Tag and disconnect all wires on the converter assembly.

(2) Remove four screws (1) securing inductor (2) to baseplate assembly (3). Remove inductor (2) from baseplate assembly (3).

(3) Remove four screws (4), four flat washers (5) and four nuts (6) securing two brackets (7) to baseplate assembly (3).

(4) Remove two brackets (7) from baseplate assembly (3). This frees capacitor (8). Remove capacitor (8) from baseplate assembly (3).

(5) Remove four screws (9), four lockwashers (10), and four flat washers (11) securing terminal board (12) to heat sink assembly (13). Remove terminal board (12) from heat sink assembly (13).

(6) Remove six screws (14) securing transformer (15) to baseplate assembly (3). Remove transformer (15) from baseplate assembly (3).

(7) Slide component board assembly (16) out of mounting bracket assembly (17).

(8) Remove four screws (18), four flat washers (19), and four nuts (20) securing mounting bracket assembly (17) to heat sink assembly (13). Remove mounting bracket assembly (17) from heat sink assembly (13) and baseplate assembly (3).

(9) Remove two nuts (21), two lockwashers (22), two flat washers (23), two insulating washers (24), two bushings (25), two insulating washers (26) securing two scr (27) to heat sink assembly (13). Remove two scr (27) from heat sink assembly (13).

(10) Remove nut (28), lockwasher (29), flat washer (30), bushing (31), flat washer (32), lug (33), and screw (34) from heat sink assembly (13).

(11) Remove six nuts (35), six lockwashers (36), six flat washers (37), six insulating washers (38), six bushings (39), and six insulating washers (40) securing six rectifiers (41) to heat sink assembly (13).

(12) Remove two screws (42), two lockwashers (43), and two flat washers (44) securing two terminals (45), capacitor (46), and capacitor (47) to heat sink assembly (13). Remove terminals (45), capacitor (46), and capacitor (47) from heat sink assembly (13).

(13) Remove four nuts (48), four flat washers (49), and four screws (50) securing heat sink assembly (13) to baseplate assembly (3). Remove heat sink assembly (13) from baseplate assembly (3).

(14) Clean, inspect, and repair (para 3–20*b*).

b. Reassembly.

(1) Position heat sink assembly (13) on baseplate assembly (3). Secure with four screws (50), four flat washers (49), and four nuts (48).

(2) Secure two terminals (45), capacitor (46), and capacitor (47) or heat sink assembly (13) with two flat washers (44), two lockwashers (43), and two screws (42).

(3) Place six rectifiers (41) on heat sink assembly (13) and secure with six insulating washers (40), six bushings (39), six insulating washers (38), six flat washers (37), six lockwashers (36), and six nuts (35).

(4) Replace screw (34), lug (33), flat washer

(32), bushing (31), flat washer (30), lockwasher (29), and nut (28) on heat sink assembly (13).

(5) Position two scr (27) on heat sink assembly (13). Secure with two insulating washers (26), two bushings (25), two insulating washers (24), two flat washers (23), two lockwashers (22), and two nuts (21).

(6) Position mounting bracket assembly (17) on heat sink assembly (13). Secure with four nuts (20), four flat washers (19), and four screws (18).

(7) Slide component board assembly (16) into mounting bracket assembly (17).

(8) Position transformer (15) on baseplate assembly (3). Secure with six screws (14).

(9) Position terminal board (12) on heat sink assembly (13). Secure with four flat washers (11), four lockwashers (10), and four screws (9).

(10) Position capacitor (8) on baseplate assembly (3). Secure with two brackets (7), four nuts (6), four flat washers (5), and four screws (4).

(11) Position inductor (2) on baseplate assembly (3). Secure with four screws (1).

(12) Reconnect all wires on the converter assembly as coded in removal.

Section V. GENERAL SUPPORT TESTING PROCEDURES

4-34. Searchlight Subassembly and Control Box

General support testing procedures for searchlight subassembly components and the control boxes are covered in TM 11—6625—1580—12.

4-35. Mounts

General support testing procedures for the searchlight mounts are identical to those in paragraphs 3—63 and 3—64.

CHAPTER 5

DEPOT MAINTENANCE

Section I. GENERAL

5–1. Scope

The 2.2-kw, 23-inch xenon searchlight must be tested thoroughly after rebuild or repair to insure that it is operating properly prior to return to stock and reissue. Use the tests described in this chapter to determine the operating capability of repaired searchlights. Depot maintenance procedures supplement direct support maintenance procedures (chap 3) and general support maintenance procedures (chap 4).

5–2. Applicable References

a. Repair Standards. Applicable procedures of the Signal Corps depot performing this test and its general standards for repaired signal equipment, form a part of the requirements for testing this equipment.

b. Technical Publications. The following technical publications are applicable to this equipment.

Equipment and subject	*Publication*
Organizational maintenance manual including repair parts and special tools list: 2.2—kw, 23-inch xenon searchlight	TM 11—6230—219—12
Operator, Organizational, GS and Depot Maintenance Manual Test Set Searchlight AN/GSM—182	TM 11—6625—1580—12 and TM 11—6625—1580—45
Tektronix Instruction Manual	Furnished with AN/GSM—184

5–3. Test Facilities Required

The following equipments, or suitable equivalents, will be employed in determining compliance with this specific standard.

a. Test Equipment.

Equipment	*Federal Stock No.*	*Quantity reqd*	*Applicable literature*
Test Set, Searchlight Depot Support AN/GSM—184	6625—933—9485	1	
Multimeter TS—352/U	6625—242—5023	1	TM 11—6625—366—15
Tool Kit TK—100/G	5180—605—0079	1	SB 11—604

b. Power Requirements.

(1) The power requirements for unit 1 (double rack assembly) of Test Set, Searchlight, Depot Support AN/GSM—184 are that a line be installed sufficiently close to the test set providing 120/208-volt, 3-phase, 4-wire power for at least 30 amperes per phase and terminating in a Pass and Seymour No. 3430 single flush outlet or equivalent. Use 3-phase wye source only since neutral is grounded. The frequency of the power must be 60 cycles per second for the first two test sets and 50 to 60 cycles per second for the third test set. The power cable supplied with unit 1 is 8 feet in length.

(2) The power requirement necessary for unit 2 is a standard 120-volt, single-phase, 50- or 60-cycle source terminating in a standard 120-volt, parallel-blade, grounding-type outlet. The line should be able to supply 20 amperes. The power cable supplied with unit 2 is 8 feet in length.

Section II. DEPOT TEST AND REPAIR PROCEDURES

5–4. Preliminary Procedures

(fig. 5—1)

CAUTION

The AN/GSM—184 is specialized test equipment. It operates at high currents and voltage. Only trained and authorized personnel will operate this test set. A key switch has been installed as a safety precaution. The key cannot be removed while the power is turned on. When the unit is not in use, the key should be kept by an authorized person.

a. Ac Power Application.

(1) Set all test panel switches to OFF.

(2) On INPUT POWER PANEL, insert key in MASTER POWER switch.

(3) Turn key clockwise to ON. Turn the INPUT POWER switch to ON. Observe AC VOLTS meter. AC VOLTS meter should indicate 108 to 132 volts.

b. Dc Power Application.

(1) On INPUT POWER PANEL, turn DC VOLTS ADJUST knob fully counterclockwise.

(2) On INPUT POWER PANEL, press DC POWER START button.

NOTE

It may be necessary to hold the button in for 1 or 2 seconds while the blower in the dc power supply attains the necessary speed. Should the blower fail, the dc power will shut off automatically.

(3) On INPUT POWER PANEL, rotate DC VOLTS ADJUST knob until DC VOLTS meter indicates 28 volts.

(4) Proceed to test(s) as directed.

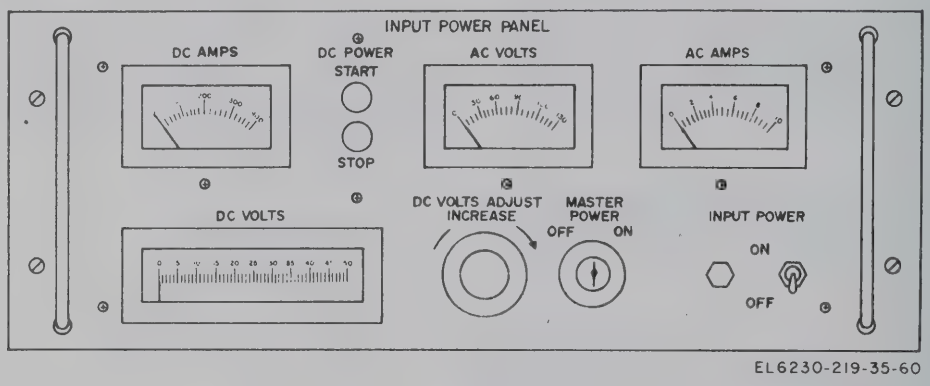


Figure 5—1. AN/GSM—184 input power panel.

5–5. Stopping Procedures

(fig. 5—1)

a. Temporary Stop.

(1) Set all test panel INPUT POWER switches to OFF.

(2) Remove test connections as required.

(3) Make test connections as required.

b. Complete Stop.

(1) Set all test panel INPUT POWER switches to OFF.

(2) On INPUT POWER PANEL, turn DC VOLTS ADJUST knob fully counterclockwise.

(3) On INPUT POWER PANEL, insert key in MASTER POWER switch. Turn key counterclockwise to OFF.

(4) Remove all test connections from test set.

5-6. Complete Replay Panel Test (Varo Model 9913)

(fig. 5-2)

a. General. Varo model 9913 is supplied only with AN/VSS-1. When it becomes unrepairable, Varo model 9922 will replace it. If performance is abnormal, refer to paragraph 4-5.

b. Procedure.

(1) On RELAY TEST PANEL, make sure no relays are plugged into test sockets.

(2) Perform preliminary procedures (para 5-4).

(3) Make connections shown in figure 5-2.

(4) On RELAY TEST PANEL, set INPUT POWER switch to ON. K7 TEST, K8 TEST, and K9/PLUG-IN RELAY TEST NORMAL lamps must light.

(5) On RELAY TEST PANEL, actuate LAMP TEST switch. Remainder of lamps on RELAY TEST PANEL must light.

(6) On RELAY TEST PANEL, actuate K7 TEST switch. K7 TEST NORMAL lamp must go out. K7 TEST ENERGIZED lamp must light.

(7) On RELAY TEST PANEL, actuate K8 TEST switch. K8 TEST NORMAL lamp must go out. K8 TEST ENERGIZED lamp must light.

(8) On RELAY TEST PANEL, actuate K9/PLUG-IN RELAY TEST switch. K9/PLUG-IN RELAY TEST NORMAL lamp must go out. K9/PLUG-IN RELAY TEST ENERGIZED lamp must light.

(9) On TIMER PANEL, set INPUT POWER switch to ON. Observe timer. If timer does not read zero, actuate TIMER RESET switch.

(10) On RELAY TEST PANEL, set controls as follows:

(*a*) K13(3 SEC)/K3(17.5 SEC) switch to K13(3 SEC).

(*b*) TDR POWER switch to up (on) position.

(*c*) Momentarily actuate TDR START switch.

(11) On TIMER PANEL, observe timer indication. Timer must indicate as follows:

(*a*) If test set is being operated from a 60-cps line, timer must indicate between 1.0 and 3.0 seconds.

(*b*) If test set is being operated from a 50-cps line, timer must indicate between 2.08 and 3.75 seconds.

(12) On TIMER PANEL, actuate TIMER RESET switch to reset timer to zero.

(13) On RELAY TEST PANEL, set controls as follows:

(*a*) K13(3 SEC)/K3(17.5 SEC) switch to K3(17.5 SEC).

(*b*) Momentarily actuate TDR START switch.

(14) On TIMER PANEL, observe timer indication. Timer must indicate as follows:

(*a*) If test set is being operated from a 60-cps line, timer must indicate between 15.0 and 20.0 seconds.

(*b*) If test set is being operated from a 50-cps line, timer must indicate between 12.5 and 16.7 seconds.

(15) On RELAY TEST PANEL ensure that BLOWER RELAY TEST (9913) switch is in OFF position.

NOTE

The following steps must be performed in the order stated or the test will be invalid.

(16) On RELAY TEST PANEL, set BLOWER RELAY TEST (9913) switch to position 1. FAIL lamp on RELAY TEST PANEL must be off.

(17) On RELAY TEST PANEL, set BLOWER RELAY TEST (9913) switch to position 2. FAIL lamp on RELAY TEST PANEL must be off.

(18) On RELAY TEST PANEL, set BLOWER

RELAY TEST (9913) switch to position 3. FAIL lamp on RELAY TEST PANEL must be off.

(19) On RELAY TEST PANEL, set BLOWER RELAY TEST (9913) switch back to position 2. FAIL lamp on RELAY TEST PANEL must light.

(20) Stop equipment (para 5—5).

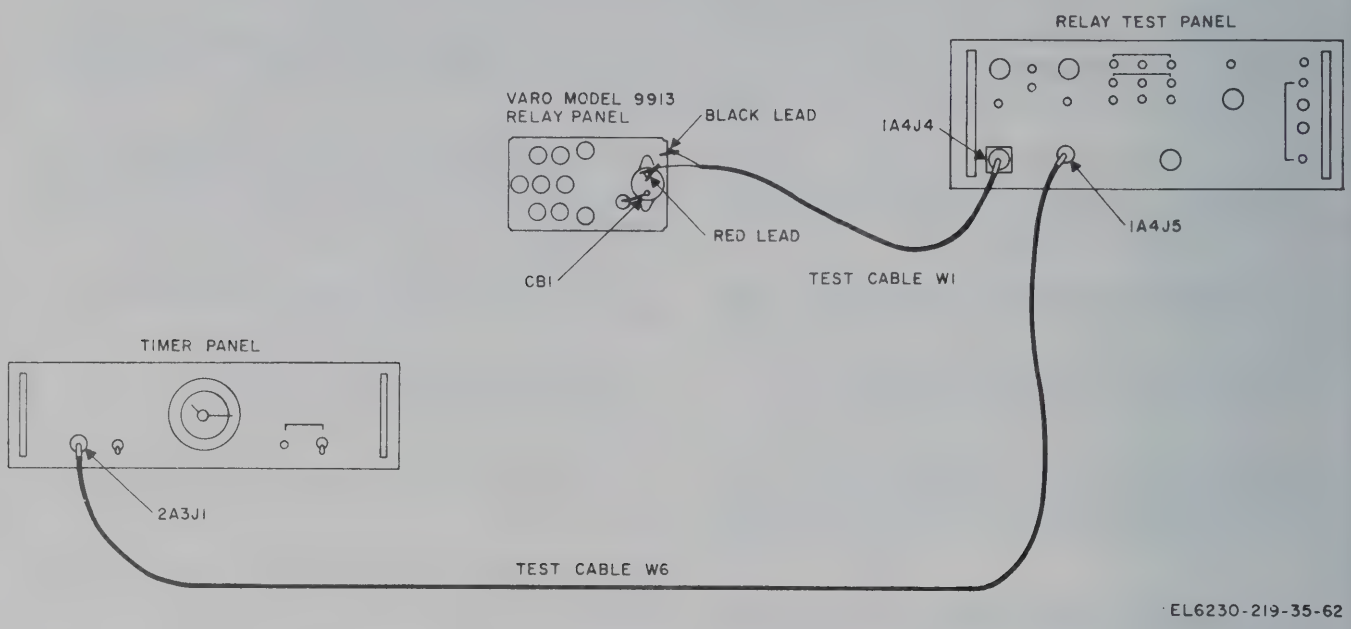


Figure 5—2. Varo model 9913, complete relay panel test setup.

5-7. Individual Relay Test (Varo Model 9913)

(fig. 5—3)

a. General. Varo model 9913 relay panel has individual plug-in relays which may be tested individually on test set RELAY TEST PANEL. Proceed as follows (if performance is abnormal, refer to paragraph 4—5):

b. Procedure.

(1) Perform preliminary procedures (para 5—4).

(2) On RELAY TEST PANEL, make sure no cable is connected to RELAY PANEL RECEPTACLE 1A4J1.

(3) On RELAY TEST PANEL, set INPUT POWER switch to ON.

(4) To test K1, K7, K8, K9, or K12, plug relay to be tested into 1A4J1 on RELAY TEST PANEL.

(5) On RELAY TEST PANEL, observe the K9/PLUG-IN RELAY TEST NORMAL lamp. Lamp must light.

(6) On RELAY TEST PANEL, actuate the K9/PLUG-IN RELAY TEST switch. K9/PLUG-IN RELAY TEST NORMAL lamp must go out. K9/PLUG-IN RELAY TEST ENERGIZED lamp must light. If not, replace relay.

(7) To test relay K13(3 sec), plug relay into K13 TEST (9913) socket on RELAY TEST PANEL.

(8) Connect test cable W6 from 1A4J5 on RELAY TEST PANEL to 2A3J1 on TIMER PANEL.

(9) On RELAY TEST PANEL, set TDR POWER switch to on (up) position.

(10) On TIMER PANEL, set INPUT POWER switch to ON.

(11) On TIMER PANEL, observe timer indication. If timer does not indicate zero, actuate TIMER RESET switch.

(12) On RELAY TEST PANEL, set K13(3 SEC)/K3(17.5 SEC) switch to K13(3 SEC).

(13) On RELAY TEST PANEL, momentarily actuate TDR START switch.

(14) On TIMER PANEL, observe timer indication. Timer must indicate as follows:

(*a*) If test set is being operated from a 60-cps line, timer must indicate between 1.0 and 3.0 seconds. If not, replace relay.

(*b*) If test set is being operated from a 50-cps line, timer must indicate between 2.08 and 3.75 seconds. If not, replace relay.

(15) To test relay K3(17.5 sec), plug relay into K3 TEST (9913) socket on RELAY TEST PANEL.

(16) Perform steps (8) through (13) above.

(17) On TIMER PANEL, observe timer indication. Timer must indicate as follows:

(*a*) If test set is being operated from a 60-cps line, timer must indicate between 15.0 and 20.0 seconds. If not, replace relay.

(*b*) If test set is being operated from a 50-cps line, timer must indicate between 12.5 and 16.7 seconds. If not, replace relay.

(18) Stop equipment (para 5—5).

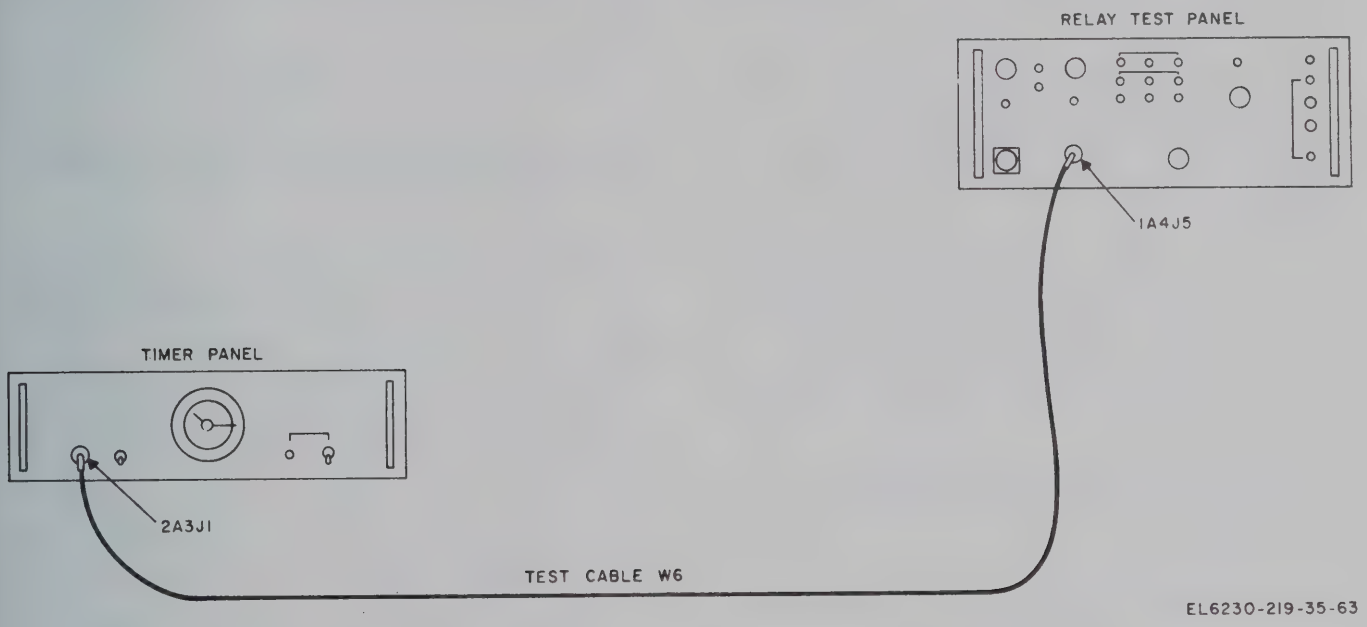


Figure 5—3. Varo model 9913 relay panel, individual relay test setup.

5–8. Complete Relay Panel Test (Varo Model 9922)

(fig. 5—4)

a. General. Varo model 9922 is used on AN/VSS—1A, AN/VSS—1B, AN/VSS—1C, AN/VSS—1D, AN/VSS—1E, AN/VSS—2 and AN/GSS—14(*). Varo model 9922 will replace all other models of relay panel as they become unrepairable. When Varo model 9922 replaces Melpar model F40015 in AN/VSS—1B, the wiring connections to drive motor limit switches must be changed (para 3—21). If performance is abnormal, refer to paragraph 4—6.

b. Procedure.

(1) On RELAY TEST PANEL, make sure no relays are plugged into test sockets.

(2) Perform preliminary procedures (para 5—4).

(3) Make connections shown in figure 5—4.

NOTE

The relay panel can be tested while still mounted in the searchlight or as a separate item. If still mounted in the searchlight,

disconnect the cable to the relay panel input connector.

(4) On RELAY TEST PANEL, set INPUT POWER switch to ON. K7 TEST, K8 TEST, and K9/PLUG-IN RELAY TEST NORMAL lamps must light.

(5) On RELAY TEST PANEL, actuate LAMP TEST switch. Remainder of lamps on RELAY TEST PANEL must light.

(6) On RELAY TEST PANEL, actuate K7 TEST switch. K7 TEST NORMAL lamp must go out. K7 TEST ENERGIZED lamp must light.

(7) On RELAY TEST PANEL, actuate K8 TEST switch. K8 TEST NORMAL lamp must go out. K8 TEST ENERGIZED lamp must light.

(8) On RELAY TEST PANEL, actuate K9/PLUG-IN RELAY TEST switch. K9/PLUG-IN RELAY TEST NORMAL lamp must go out. K9/PLUG-IN RELAY TEST ENERGIZED lamp must light.

(9) On TIMER PANEL, set INPUT POWER switch to ON. Observe timer. If timer does not read zero, actuate TIMER RESET switch.

(10) On RELAY TEST PANEL, set controls as follows:

(*a*) K13(3 SEC)/K3(17.5 SEC) switch to K13(3 SEC).

(*b*) TDR POWER switch to up (on) position.

(*c*) Momentarily actuate TDR START switch.

(11) On TIMER PANEL, observe timer indication. Timer must indicate as follows:

(*a*) If test set is being operated from a 60-cps line, timer must indicate between 1.0 and 3.0 seconds.

(*b*) If test set is being operated from a 50-cps line, timer must indicate between 2.08 and 3.75 seconds.

(12) On TIMER PANEL, actuate TIMER RESET switch to reset timer to zero.

(13) On RELAY TEST PANEL, set controls as follows:

(*a*) K13(3 SEC)/K3(17.5 SEC) switch to K3(17.5 SEC).

(*b*) Momentarily actuate TDR START switch.

(14) On TIMER PANEL, observe timer indication. Timer must indicate as follows:

(*a*) If test set is being operated from a 60-cps line, timer must indicate between 15.0 and 20.0 seconds.

(*b*) If test set is being operated from a 50-cps line, timer must indicate between 12.5 and 16.7 seconds.

(15) Stop equipment (para 5—5).

5-9. Complete Relay Panel Test (Melpar Model F40015)

(fig. 5—4)

a. General. Melpar model F40015 is supplied only with AN/VSS—1B and AN/VSS—1C searchlights. When it becomes unrepairable, Varo model 9922 will replace it; however wiring connections to the drive motor limit switches must be changed to enable searchlight to operate properly (para 3—21). If performance is abnormal, refer to paragraph 4—7.

b. Procedure.

(1) On RELAY TEST PANEL, make sure no relays are plugged into test sockets.

(2) Perform preliminary procedures (para 5—4).

(3) Make connections shown in figure 5—4.

NOTE

The relay panel can be tested while still mounted in the searchlight or as a separate item. If still mounted in the searchlight, disconnect the cable to relay panel input connector.

(4) On RELAY TEST PANEL, set INPUT POWER switch to ON. K7 TEST, K8 TEST, and

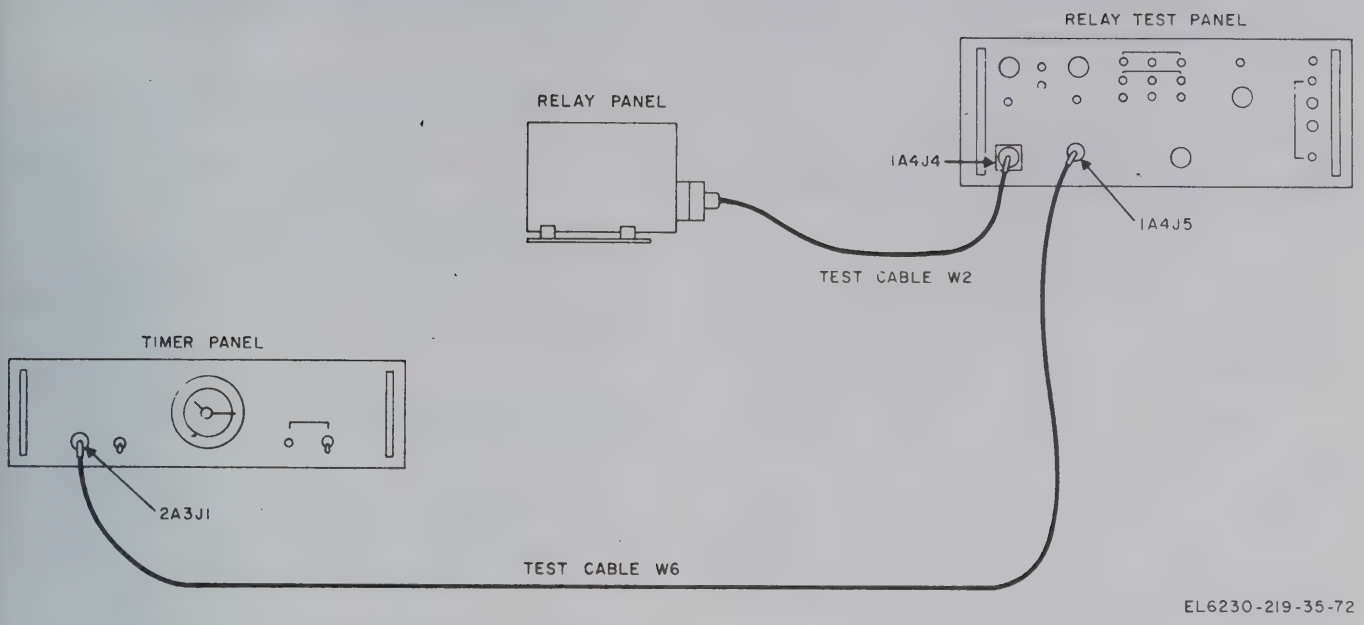


Figure 5—4. Varo model 9922 and Melpar model F40015, complete relay panel test setup.

K9/PLUG-IN RELAY TEST NORMAL lamps must light.

(5) On RELAY TEST PANEL, actuate LAMP TEST switch. Remainder of lamps on RELAY TEST PANEL must light.

(6) On RELAY TEST PANEL, actuate K7 TEST switch. K7 TEST NORMAL lamp must go out. K7 TEST ENERGIZED lamp must light.

(7) On RELAY TEST PANEL, actuate K8 TEST switch. K8 TEST NORMAL lamp must go out. K8 TEST ENERGIZED lamp must light.

(8) On relay test panel, actuate K9/PLUG-IN RELAY TEST switch. K9/PLUG-IN RELAY TEST NORMAL lamp must go out. K9/PLUG-IN RELAY TEST ENERGIZED lamp must light.

(9) On TIMER PANEL, set INPUT POWER switch to ON. Observe timer. If timer does not read zero, actuate TIMER RESET switch.

(10) On RELAY TEST PANEL, set controls as follows:

(*a*) K13(3 SEC)/K3 (17.5 SEC) switch to K13(3 SEC).

(*b*) TDR POWER switch to up (on) position.

(*c*) Momentarily actuate TDR START switch.

(11) On TIMER PANEL, observe timer indication. Timer must indicate as follows:

(*a*) If test is being operated from a 60-cps line, timer must indicate between 1.0 and 3.0 seconds.

(*b*) If test is being operated from a 50-cps line, timer must indicate between 2.08 and 3.75 seconds.

(12) On TIMER PANEL, actuate TIMER RESET switch to reset timer to zero.

(13) On RELAY TEST PANEL, set controls as follows:

(*a*) K13(3 SEC)/K3(17.5 SEC) switch to K3(17.5 SEC).

(*b*) Momentarily actuate TDR START switch.

(14) On TIMER PANEL, observe timer indication. Timer must indicate as follows:

(*a*) If test set is being operated from a 60-cps line, timer must indicate between 15.0 and 20.0 seconds.

(*b*) If test set is being operated from a 50-cps line, timer must indicate between 12.5 and 16.7 seconds.

(15) Stop equipment (para 5—5).

5–10. Power Relay K2 and K14 Tests

(fig. 5—5)

a. General. This paragraph covers the test of converter power relay K14 and overdrive relay K2.

b. Procedure.

(1) Perform preliminary procedures (para 5—4).

(2) Make connections shown in figure 5—5. Position relay in the test fixture on POWER RELAY TEST PANEL. Place nuts on relay terminals and tighten securely.

(3) Turn oscilloscope on. Allow it to warm up for at least 5 minutes.

NOTE

Refer to Tektronix Instruction Manual furnished with AN/GSM—184 for oscilloscope operating procedures.

(4) On oscilloscope:

(*a*) Set scope to either channel.

(*b*) Connect a X10 probe to scope input.

(*c*) Set channel sensitivity to 0.02 volt per cm.

NOTE

Use of the X10 probe makes the sensitivity 0.2 volt per cm or 200 millivolts per cm.

(5) Connect ground lead of scope probe to BLACK (-) terminal to which the power relay is connected.

CAUTION

Do not connect ground lead of the scope probe to RED (+) terminal. Damage will result to scope probe.

(6) Set scope trace to coincide with center horizontal graticule line of scope screen.

(7) On COMPLETE SEARCHLIGHT TEST PANEL:

(*a*) Turn MODE SWITCH to VIS WIDE

(*b*) Turn SLT POWER switch to STANDBY

(*c*) Turn POWER switch to ON

(8) On POWER RELAY TEST PANEL, turn POWER switch to ON.

(9) On COMPLETE SEARCHLIGHT TEST PANEL, turn SLT POWER switch to ON.

(10) On INPUT POWER PANEL, adjust DC VOLTS ADJUST for reading of 100 amperes on DC AMPS meter. If 100 amperes cannot be reached, relay contacts are probably burned.

(11) Connect scope probe to RED (+) terminal of POWER RELAY TEST PANEL.

(12) Observe scope indication. Voltage drop must be less than 500 millivolts.

NOTE

Each centimeter of deflection on scope represents 200-millivolt drop across relay.

(13) Stop equipment (para 5—5).

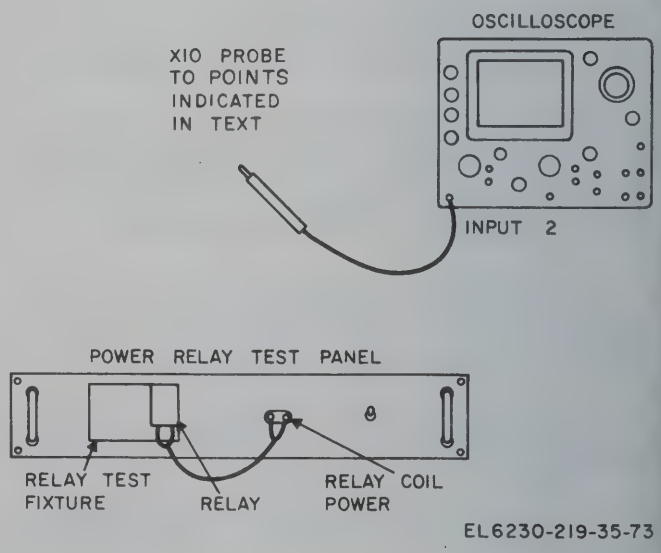


Figure 5—5. Power relay test setup.

5–11. Igniter Test

(fig. 5—6)

a. General. The igniter must be removed from the searchlight for this test.

WARNING

Because of high voltages involved in test panel, the procedure should be followed carefully.

b. Procedure.

(1) Perform preliminary procedures (para 5—4).

(2) On IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL, set controls as follows:

(*a*) INPUT POWER to OFF

(*b*) LAMP MAIN D.C. to OFF

(*c*) CONVERTER OUTPUT to OFF

(*d*) TEST SELECT to IGNITER TEST

(*e*) CONVERTER OUTPUT VOLTAGE ADJUST fully clockwise

(3) Pull IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL chassis out. (The chassis is on slides.)

(4) Open lamp housing door on right side of IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL.

WARNING

Exercise extreme care when handling high-pressure xenon lamps. Always keep lamps in their containers. Use a protective face mask, blacksmiths apron, and gloves when removing, installing, or otherwise handling xenon lamps, as a safety precaution against possible lamp explosion.

CAUTION

Do not touch or allow solvents and other foreign materials to contact quartz portion of the lamp. Oils from skin will cause a gradual breakdown of crystalline structure of quartz and early lamp failure will result.

(5) Slide known good xenon lamp into test panel lamp housing, connector end first. Be sure to position it so that it mates properly with door. Close door.

(6) Connect high-voltage cable, internal to IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL, to lamp. Make sure lamp bail is seated properly over connector and that connector ring on other end is tight.

(7) Slide IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL back in to actuate interlock switch for operation.

(8) Place igniter to be tested flat on work surface. Make connections shown in figure 5—6. Make sure dark shaded glass cover is not screwed on viewing port.

(9) On IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL:

(*a*) Turn INPUT POWER switch to ON.

(*b*) Momentarily actuate LAMP TEST switch.

(*c*) Observe CONVERTER RUNNING lamp.

(10) Igniter must run for not less than 3 seconds. Lamp must light with one continuous

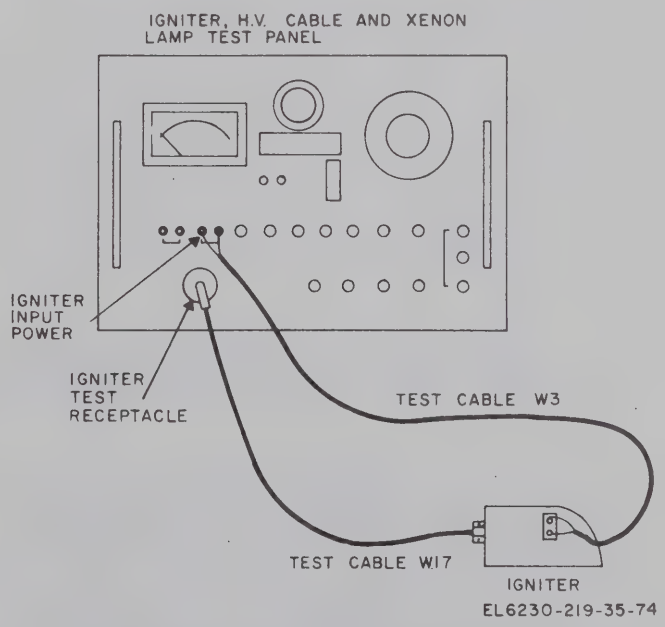


Figure 5—6. Igniter test setup.

spark during entire time the CONVERTER RUNNING lamp is on.

NOTE

Any erratic spark or lack of spark is a sign of a defective igniter. The igniter is a potted assembly and is replaceable.

(11) Stop equipment (para 5—5).

5-12. High-Voltage Cable Test
(fig. 5—6)

a. General. The high-voltage cable must be removed from the searchlight for this test. Refer to figure 5—6 for illustration of IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL.

WARNING

Because of high voltages involved in test panel, procedure should be followed carefully.

b. Procedure.

(1) Perform preliminary procedures (para 5—4).

(2) On IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL, set controls as follows:

(*a*) INPUT POWER to OFF.

(*b*) LAMP MAIN D.C. to OFF.

(*c*) CONVERTER OUTPUT to ON.

(*d*) TEST SELECT to HI-VOLT CABLE TEST.

(*e*) CONVERTER OUTPUT VOLTAGE ADJUST fully clockwise.

(3) Pull IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL chassis out. (The chassis is on slides.)

(4) Open lamp housing door on right side of IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL.

WARNING

Exercise extreme care when handling high-pressure xenon lamps. Always keep lamps in their containers. Use a protective face mask, blacksmiths apron, and gloves when removing, installing, or otherwise handling xenon lamps, as a safety precaution against possible lamp explosion.

CAUTION

Do not touch or allow solvents and other foreign materials to contact quartz portion of the lamp. Oils from skin will cause a gradual breakdown of the crystalline structure of the quartz and early lamp failure will result.

(5) Slide a known good xenon lamp into test panel lamp housing, connector end first. Be sure to position it so that it mates properly with door. Close door.

(6) Connect the high-voltage cable, internal to IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL, to lamp. Make sure lamp bail is seated properly over connector and that connector ring on the other end is tight.

(7) Slide IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL back in to actuate interlock switch for operation. Make sure dark shaded glass cover is not screwed on the viewing port.

(8) On IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL:

(*a*) Turn INPUT POWER switch to ON.

(*b*) Momentarily actuate LAMP TEST switch.

(*c*) Observe CONVERTER RUNNING lamp.

(9) Igniter must run for not less than 3 seconds. Lamp must light with one continuous spark during entire time CONVERTER RUNNING lamp is on. If lamp does not spark, it indicates that high-voltage cable has broken down. A carbonized path is created and it will continue to break down at an even lower potential. Discard a broken down cable; it is nonrepairable.

5-13. Xenon Lamp Test
(fig. 5—6)

a. General. The xenon lamp must be removed from the searchlight for this test. Figure 5—6 is an

illustration of IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL.

WARNING

Because of high voltages involved in this test panel, the procedure should be followed carefully.

b. Procedure.

(1) Perform preliminary procedures (para 5—4).

(2) Remove lamp from lamp housing and inspect as follows:

WARNING

Exercise extreme care when handling high-pressure xenon lamps. Always keep lamps in their containers. Use a protective face mask, blacksmiths apron, and gloves when removing, installing, or otherwise handling xenon lamps, as a safety precaution against possible lamp explosion.

(*a*) Check for burned spots on mating surfaces of all power connection points.

(*b*) Check to see that starting wire has not been bent or broken.

(*c*) Check that quartz envelope is free from blemishes and that inside of the bulb close to the anode (large electrode) is not darkened to excess.

CAUTION

Do not touch or allow solvents and other foreign materials to contact quartz portion of the lamp. Oils from the skin will cause a gradual breakdown of the crystalline structure of the quartz and early lamp failure will result.

(*d*) Check tungsten electrodes to see that no extremely dark spots are present.

(*e*) Check to see that electrodes do not have a greenish appearance.

NOTE

Any of the above characteristics will indicate a bad lamp. To verify, proceed as outlined below.

(3) On IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL, set controls as follows:

(*a*) INPUT POWER to OFF.

(*b*) LAMP MAIN D.C. to ON.

(*c*) CONVERTER OUTPUT to ON.

(*d*) TEST SELECT to XENON LAMP TEST.

(*e*) CONVERTER OUTPUT VOLTAGE ADJUST full clockwise.

(4) Pull IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL chassis out. (The chassis is on slides.)

(5) Open lamp housing door on right side of IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL.

(6) Slide lamp to be tested into test panel lamp housing, connector end first. Be sure to position it so that it mates properly with door. Close door.

(7) Connect high-voltage cable, internal to IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL to lamp. Make sure lamp bail is seated properly over connector and that connector ring on the other end is tight.

(8) Slide IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL back in to actuate interlock switch for operation. Make sure dark shaded glass cover is screwed on the viewing port.

(9) On IGNITER, H.V. CABLE AND XENON LAMP TEST PANEL, set controls as follows:

(*a*) Set INPUT POWER switch to ON.

(*b*) Momentarily actuate LAMP TEST switch. Observe lamp through viewing port. Lamp must light.

NOTE

A protective thermostat will automatically limit lamp operation to about 30 seconds. When a lamp starts to go bad, it generally deteriorates quickly. A good way to tell whether a lamp is starting to deteriorate is to observe any darkening of the inside of

the quartz envelope. It will start darkening near the top of the inside first. Any darkening of the quartz envelope causes the quartz to absorb heat, resulting in a rapid increase in bulb temperature until the quartz-to-metal seals go. After checking that the lamp lights, let the lamp cool thoroughly before removing (at least 5 minutes). While removing lamp, observe safety precautions in *b*(2), above.

(10) Stop equipment (para 5—5).

(11) Destroy defective lamp (para 5—25).

5-14. Drive Motor Test

(fig. 5—7)

a. General. The GEAR MOTOR TEST PANEL tests the drive motor assemblies by monitoring the current drawn by each motor and measuring the time required to change modes. The drive motors may be tested while still in the searchlight or they may be removed with the xenon lamp housing assembly.

b. Procedure.

(1) Perform preliminary procedures (para 5—4).

(2) Make connections shown in figure 5—7.

(3) On GEAR MOTOR TEST PANEL, set controls as follows:

(*a*) REFRACTOR, BLACKOUT, and FILTER switches to off (down) position.
(*b*) POWER switch to OFF.

(4) On TIMER PANEL, set INPUT POWER switch to ON.

(5) On GEAR MOTOR TEST PANEL, set POWER switch to ON.

NOTE

Drive motors may run until the shells around the lamp housing stop in the modes of operation determined by the three mode switches on GEAR MOTOR TEST PANEL.

(6) On TIMER PANEL, actuate TIMER RESET switch to set timer to zero.

(7) On GEAR MOTOR TEST PANEL, set REFRACTOR switch to the up (on) position. Following actions must occur:

(*a*) Refractor shell around lamp housing must revolve to opposite direction.
(*b*) GEAR MOTOR TEST PANEL DC AMPS meter must indicate less than 1 ampere.

NOTE

Higher currents indicate a mechanical binder either in the motor or in the shell it drives. The motor mount can be loosened and the motor pulled away from the shell it drives. If the current is still high, then the motor is binding.

(*c*) If test set is being operated from a 60-cps line, timer on TIMER PANEL must indicate 2.0 seconds or less.

(*d*) If test set is being operated from a 50-cps

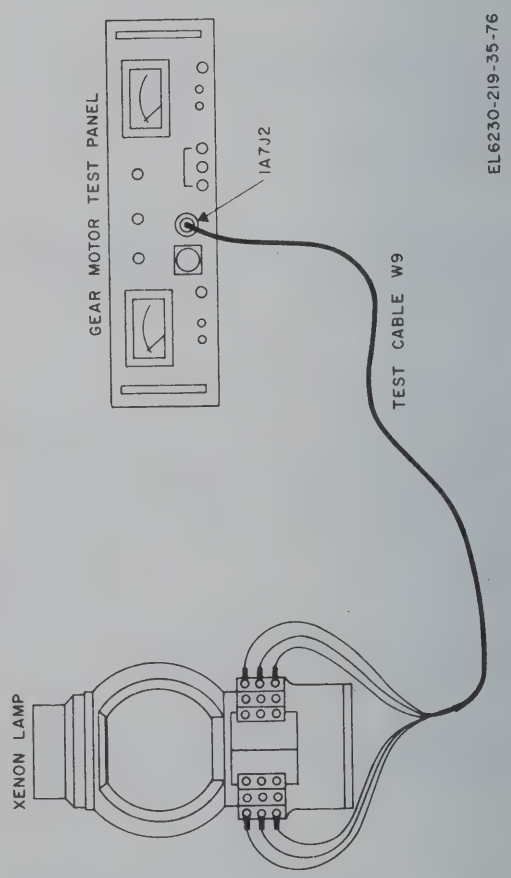


Figure 5—7. Drive motor test setup.

line, timer on TIMER PANEL must indicate 1.67 seconds or less.

(8) Repeat (6) above.

(9) On GEAR MOTOR TEST PANEL, set BLACKOUT switch to up (on) position. Conditions described in (7) above must occur.

(10) Repeat (6) above.

(11) On GEAR MOTOR TEST PANEL, set FILTER switch to up (on) position. Conditions described in (7) above must occur.

NOTE

If time required to change modes is longer than specified time, replace drive motor.

(12) Stop equipment (para 5—5).

5–15. Blower Motor Test

(fig. 5—8)

a. General. In this test, the voltage and current to blower motor are monitored, and speed of the motor is measured.

b. Procedure.

(1) Perform preliminary procedures (para 5—4).

(2) Make connections shown in figure 5—8.

(3) Make a dark mark on outside flat surface of squirrel-cage fan of blower motor.

(4) On BLOWER MOTOR TEST PANEL, set INPUT POWER switch to up (on) position.

(5) On INPUT POWER PANEL, adjust DC VOLTS ADJUST knob for 25 volts on DC VOLTS meter.

(6) On BLOWER MOTOR TEST PANEL, observe DC AMPS meter indication. DC AMPS meter must indicate 9.5 amperes or less.

(7) Measure motor speed with stroboscope. Motor speed must be between 8,100 and 9,900 rpm.

NOTE

If current exceeds 9.5 amperes, or motor speed is out of tolerance, replace motor brushes. If problem persists, check for mechanical binding, such as bearings or armature drag. Repair or replace as necessary.

(8) Stop equipment (para 5—5).

5–16. Control Box C–7163/VSS–1 Test

(fig. 5—9)

a. General. This paragraph covers the test and troubleshooting of tank control box. The CONTROL BOX TEST PANEL tests the wiring, the operation of the switches, and the overdrive control lamp in the tank control box.

b. Procedure.

(1) Perform preliminary procedures (para 5—4).

(2) Place tank control box to be tested on working surface. Set controls as follows:

(*a*) Mode SELECTOR SWITCH to BO.

(*b*) SEARCHLIGHT power switch to OFF.

(3) Make connections shown in figure 5—9.

(4) On CONTROL BOX TEST PANEL, turn POWER switch to ON. Check test panel lamps by turning LAMP TEST switch on. All lamps on test panel must light. Replace any bad lamps. Turn LAMP TEST switch off.

(5) On tank control box, turn SEARCHLIGHT power switch to STANDBY.

(6) On CONTROL BOX TEST PANEL, BLACKOUT/STANDBY lamp must light.

NOTE

If it does not light, check wiring in tank control box from J5—C to S1—2 and from S1—1 to J5—D. Repair or replace defective wiring. If wiring is good, replace S1.

(7) On tank control box, turn SEARCHLIGHT power switch to ON.

(8) On CONTROL BOX TEST PANEL, BLACKOUT/STANDBY lamp must remain on and other lamps must go out.

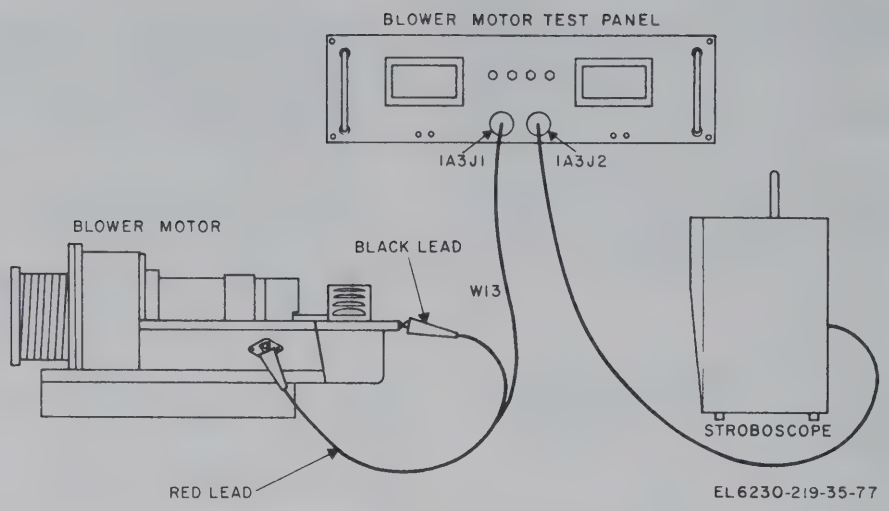


Figure 5—8. Blower motor test setup.

NOTE
If not, check for open and/or replace S2.

(9) On tank control box, turn mode SELECTOR SWITCH to IR WIDE.

(10) On CONTROL BOX TEST PANEL, BLACKOUT/STANDBY lamp must go out and IR WIDE lamp must light.

NOTE
If not, check wire from S2—18, 12 to J5—A and wire from S2—22, 23, 27, 28 to J5—F. Repair or replace defective wiring. If wiring is good, check for open and/or replace S2.

(11) On tank control box, turn mode SELECTOR SWITCH to IR FOCUS.

(12) On CONTROL BOX TEST PANEL, IR FOCUS lamp must light and other lamps should be off.

NOTE
If not, check for open and/or replace S2.

(13) On tank control box, turn mode SELECTOR SWITCH to VIS WIDE.

(14) On CONTROL BOX TEST PANEL, VIS WIDE lamp must light and other lamps should be off.

NOTE
If not, check wire from S2—32, 33 to J5—E. Repair or replace defective wiring. If wiring is good, check for open and/or replace S2.

(15) On tank control box, turn mode SELECTOR SWITCH to VIS FOCUS.

(16) On CONTROL BOX TEST PANEL, VIS FOCUS lamp must light and other lamps should be off.

NOTE
If not, check for open and/or replace S2.

(17) On tank control box, pull mode SELECTOR SWITCH out for overdrive. Tank control box indicator lamp must light. On CONTROL BOX TEST PANEL, OVERDRIVE lamp must light. If indications are abnormal, proceed as follows:

(*a*) If lamp on test panel lights but lamp on tank control box does not, remove tank control box indicator lamp. Check continuity with ohmmeter. If lamp is good, check wire from overdrive switch to XDS1 and wire from XDS1 to S2—11. Repair or replace defective wiring.

(*b*) If lamp on tank control box lights, but lamp on test panel does not light, check wire from the overdrive switch to J1—B. Repair or replace defective wiring.

(*c*) If neither lamp lights, check wire from overdrive switch through ground to J5—G.

(18) Stop equipment (para 5—5).

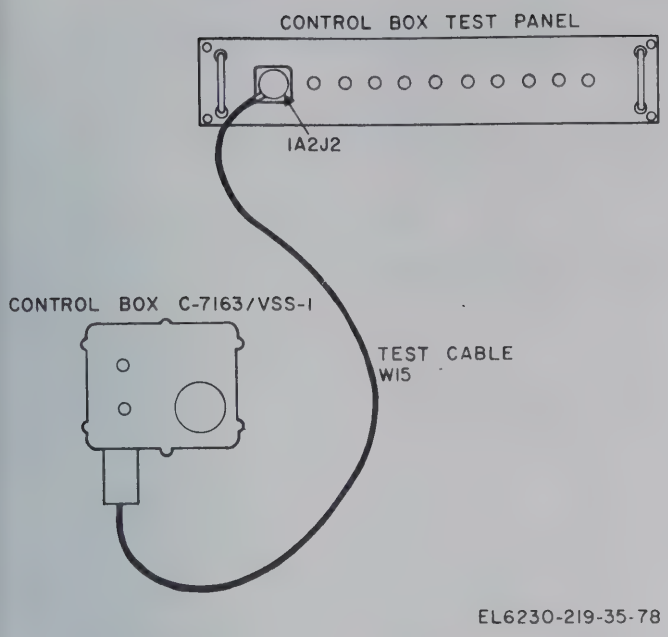


Figure 5—9. Control Box C—7163/VSS—1, test setup.

5—17. Control Box C—7164/GSS—14 Test

(fig. 5—10)

a. General. This paragraph covers the test and troubleshooting of universal control box. The CONTROL BOX TEST PANEL tests the wiring, the operation of the switches, and the overdrive lamp.

b. Procedure.

(1) Place universal control box to be tested on working surface. Remove cover plate. Remove power relay and test (para 5—10). If power relay is good, reinstall. If bad, replace relay.

(2) Remove C2 from universal control box. Connect ohmmeter across C2 (RX10K scale). Meter should indicate low resistance initially and then charge toward high resistance. Do not replace C2 at this time.

(3) Momentarily short C1 to discharge it. Connect ohmmeter across C1 (RX100 scale). Observe polarity. Meter should initially indicate a short and after 10 seconds should charge to approximately 10 on meter scale. If meter does not indicate this charging characteristic, replace C1. Reconnect C2 in universal control box.

(4) Connect ohmmeter from J1—A to J2—D on universal control box. Turn universal control box main power switch to ON. Meter should indicate a short. If open, check main power switch and circuit breaker CB2 for continuity. Replace where necessary.

(5) Turn universal control box mode SELECTOR SWITCH to BLACKOUT and universal control box power switches to OFF.

(6) Perform preliminary procedures (para 5—4).

(7) Make connections shown in figure 5—10.

(8) On CONTROL BOX TEST PANEL, turn POWER switch to ON. Check test panel lamps by pressing LAMP TEST switch. All lamps on test panel should be on. Replace any bad lamps. Release LAMP TEST switch.

(9) On universal control box, turn main power switch to ON and SEARCHLIGHT power switch to STANDBY.

(10) On CONTROL BOX TEST PANEL, STANDBY/BLACKOUT lamp must light.

NOTE

If STANDBY/BLACKOUT lamp does not light, disconnect test cable W18. Check continuity of CB1. Replace CB1, if open. Check for short circuit between terminals 1 and 2 of S1 (RXL scale). Replace S1, if open. Check for broken wires or shorts in wiring and/or replace S2.

(11) On universal control box, turn SEARCHLIGHT power switch to ON.

(12) On CONTROL BOX TEST PANEL, STANDBY/BLACKOUT lamp must remain on.

NOTE

If STANDBY/BLACKOUT lamp goes out, check to see that universal control box mode SELECTOR SWITCH is still in BLACKOUT. If it is, check for breaks or shorts in wiring and/or replace S2.

(13) On universal control box, turn mode SELECTOR SWITCH to IR WIDE.

(14) On CONTROL BOX TEST PANEL,

BLACKOUT/STANDBY lamp must go out, and IR WIDE lamp must light.

NOTE
If not, check wires W17, W15, W20, W19, W18, and W14 for continuity. Repair or replace defective wiring.

(15) On universal control box, turn mode SELECTOR SWITCH to VIS WIDE.

(16) On CONTROL BOX TEST PANEL, VIS WIDE lamp must light and other lamps must be off.

NOTE
If VIS WIDE lamp does not light, check wires W22 and W13 for continuity. Repair or replace defective wiring. If wiring is good, check for shorts, and/or replace S2.

(17) On universal control box, turn mode SELECTOR SWITCH to VIS FOCUS.

(18) On CONTROL BOX TEST PANEL, VIS FOCUS lamp must light and other lamps must be off.

NOTE
If not, check for shorts and/or replace S2.

(19) On universal control box, pull mode SELECTOR SWITCH out for overdrive. Universal control box indicator lamp must light. On CONTROL BOX TEST PANEL, OVERDRIVE lamp must light. If indications are abnormal, proceed as follows:

(*a*) If lamp on test panel lights, but lamp on universal control box does not, remove universal control box indicator lamp. Check its continuity with ohmmeter. If defective, replace. If good, check wire W16 for continuity. Repair or replace defective W16.

(*b*) If lamp on universal control box lights, but lamp on test panel does not, check wire W8 for continuity. Repair or replace defective W8.

(*c*) If neither lamp lights, check wire W27 for continuity. Repair or replace W27.

(20) Stop equipment (para 5—5).

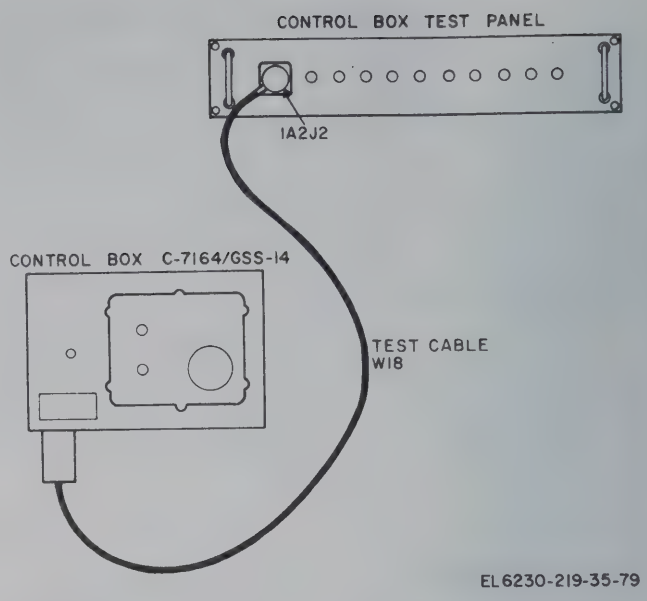


Figure 5—10. Control Box C—7164/GSS—14, test setup.

5—18. Converter Test (Varo Model 9912 and Melpar Model F50001)

(fig. 5—11)

a. General. Varo model 9912 and Melpar model F50001 converters are the same electrically. Reference designators are the same in both cases. This test will be used for both models.

b. Procedure.

(1) Perform preliminary procedures (para 5—4).

(2) Make connections shown in figure 5—11. Be sure wires 1 through 6 on test cable W16 connect to terminals 1 through 6 respectively on converter.

(3) On CONVERTER TEST PANEL, set controls as follows:

(*a*) POWER INPUT switch to ON

(*b*) 22V LOAD switch to OFF

(*c*) 24V LOAD switch to OFF

(4) On INPUT POWER PANEL, adjust DC VOLTS ADJUST knob for reading of 24 volts dc on DC VOLTS meter.

(5) On CONVERTER TEST PANEL, momen-

tarily actuate CONV START switch. Observe test panel circuit breaker.

(*a*) If CONVERTER TEST PANEL circuit breaker does not trip, proceed to paragraph 4—8.

(*b*) If CONVERTER TEST PANEL circuit breaker does trip, reset circuit breaker. Turn POWER INPUT switch to OFF. Proceed to (6) below.

(6) Set the AN/GSM—184 test set to provide an input voltage at 22 volts dc with no load (1 ohm).

(7) Measure the dc output voltage, ac output voltage, and dc output current of the converter assembly under test. The measured values must be within the limits listed in the following table:

Converter model	Dc output voltage (volts)		Ac output voltage (volts)		Dc output current (amperes)	
	Min	Max	Min	Max	Min	Max
9912	24	30	30	35	22	30
F50001	24	30	20	25	22	30

(8) Set the AN/GSM—184 test set to provide an input voltage of 28 volts dc under load (4 ohms).

(9) Measure the dc output voltage, ac output voltage, and dc output current of the converter assembly under test. The measured values must be within the limits listed in the following table:

Converter model	Dc output voltage (volts)		Ac output voltage (volts)		Dc output current (amperes)	
	Min	Max	Min	Max	Min	Max
9912	50	60	45	50	10	15
F50001	50	60	30	40	10	15

(10) Stop equipment (para 5—5).

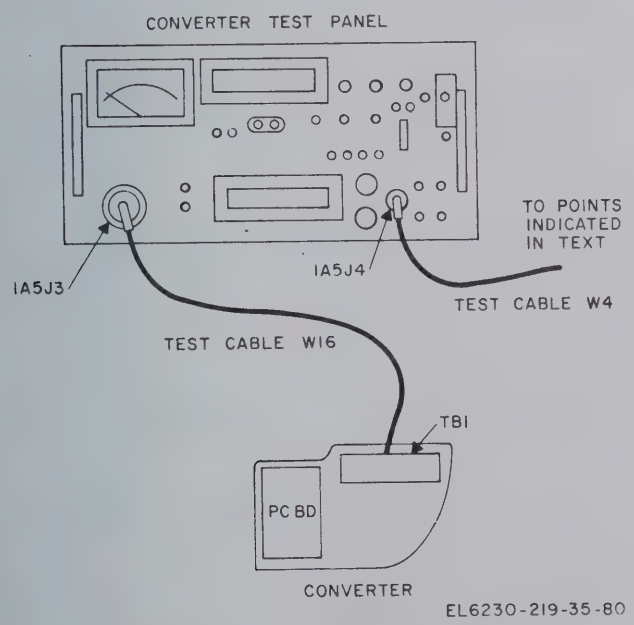


Figure 5—11. Converter test setup.

5—19. Converter Test (Varo Model 9924) (fig. 5—11)

a. General. All converter models are interchangeable. When Varo model 9924 becomes unrepairable and replacement converter assemblies of these models are unavailable, Varo model 9948 will replace them.

b. Procedure.

(1) Perform preliminary procedures (para 5—4).

(2) Make connections shown in figure 5—11. Make sure wires 1 through 6 on test cable W16 connect to terminals 1 through 6 respectively on converter.

(3) On CONVERTER TEST PANEL, set controls as follows:

(*a*) POWER INPUT switch to ON.

(*b*) 22V LOAD switch to OFF.

(*c*) 24V LOAD switch to OFF.

(4) On INPUT POWER PANEL, adjust DC VOLTS ADJUST knob for reading of 24 volts dc on DC VOLTS meter.

(5) On CONVERTER TEST PANEL, momentarily actuate CONV START switch. Observe test panel circuit breaker.

(*a*) If circuit breaker does not trip, proceed to paragraph 4—9.

(*b*) If circuit breaker does trip, reset breaker. Turn POWER INPUT switch to OFF. Proceed to (6) below.

(6) Set the AN/GSM—184 test set to provide

an input voltage at 22 volts dc with no load (1 ohm).

(7) Measure the dc output voltage, ac output voltage, and dc output current of the converter assembly under test. The measure values must be within the limits listed in the following table:

Converter model	Dc output voltage (volts)		Ac output voltage (volts)		Dc output current (amperes)	
	Min	Max	Min	Max	Min	Max
9924	24	30	30	40	22	30

(8) Set the AN/GSM—184 test set to provide an input voltage of 28 volts dc under no load (4 ohms).

(9) Measure the dc output voltage, ac output voltage, and dc output current of the converter assembly under test. The measure values must be within the limits listed in the following table:

Converter model	Dc output voltage (volts)		Ac output voltage (volts)		Dc output current (amperes)	
	Min	Max	Min	Max	Min	Max
9924	50	60	70	90	10	15

(10) Stop equipment (para 5—5).

5-20. Converter Test (Varo Model 9948) (fig. 5—11)

a. General. Varo model 9948 will replace all other converter models as they become unrepairable.

b. Procedure.

(1) Perform preliminary procedures (para 5—4).

(2) Make connections shown in figure 5—11. Make sure wires 1 through 6 on test cable W16 connect to terminals 1 through 6 respectively on converter.

(3) On CONVERTER TEST PANEL, set controls as follows:

(*a*) POWER INPUT switch to ON.

(*b*) 22V LOAD switch to OFF.

(*c*) 24V LOAD switch to OFF.

(4) On INPUT POWER PANEL, adjust DC VOLTS ADJUST knob for reading of 24 volts dc on DC VOLTS meter.

(5) On CONVERTER TEST PANEL, momentarily actuate CONV START switch. Observe test panel circuit breaker.

(*a*) If circuit breaker does not trip, proceed to paragraph 4—10.

(*b*) If circuit breaker trips, reset breaker. Turn POWER INPUT switch to OFF. Proceed to (6) below.

(6) Remove printed circuit board from converter.

(7) Plug printed circuit board into CONVERTER TEST PANEL socket marked MODEL 9948 CONV BOARD TESTER. Be sure components are on left side.

(8) Turn on test set oscilloscope power switch. Connect channel 1 probe of scope to OUPT 1 on CONVERTER TEST PANEL.

(9) Connect channel 2 probe of scope to OUPT 2 on CONVERTER TEST PANEL. Connect one probe ground lead to black FILTER TEST jack.

NOTE

Refer to Tektronix Instruction Manual furnished with AN/GSM—184 for oscilloscope operating procedures.

(10) On CONVERTER TEST PANEL, set POWER INPUT switch to ON. Set PC BD PWR switch to ON.

(11) Synchronize oscilloscope. Observe waveform. Pulses must be seen on both channels. Rate must be 666 cps ±10 percent (1.5 us. between pulses). These pulses must be in phase.

(*a*) If pulses are present, turn off POWER INPUT and PC BD PWR switches. Proceed to (12) below.

(*b*) If pulses are not present, proceed to paragraph 4—10.

(12) Replace printed circuit board in converter.

(13) Make connections shown in figure 5—11.

(14) On CONVERTER TEST PANEL, set POWER INPUT switch to ON.

(15) On INPUT POWER PANEL, adjust DC VOLTS ADJUST knob for a reading of 22 volts dc on DC VOLTS meter.

(16) On CONVERTER TEST PANEL, momentarily actuate CONV START switch. Observe CONV DC OUTPUT meter indication. Meter must indicate 42 volts dc ±10 percent.

(17) On CONVERTER TEST PANEL, set 22V LOAD switch to ON. Momentarily actuate CONV START switch. Observe CONV DC OUTPUT meter indication. Meter must indicate 28.5 volts dc ±10 percent. Set 22V LOAD switch to OFF.

(18) On INPUT POWER PANEL, adjust DC VOLTS ADJUST knob for reading of 24 volts dc on DC VOLTS meter.

(19) On CONVERTER TEST PANEL, momentarily actuate CONV START switch. Observe CONV DC OUTPUT meter indication. Meter must indicate 45 volts dc ±10 percent.

(20) On CONVERTER TEST PANEL, set 24V LOAD switch to ON. Momentarily actuate CONV START switch. Observe CONV DC OUTPUT meter indication. Meter must indicate 28.5 volts dc ±10 percent. Set 24V LOAD switch to OFF.

(21) On INPUT POWER PANEL, adjust DC VOLTS ADJUST knob for reading of 28 volts dc on DC VOLTS meter.

(22) On CONVERTER TEST PANEL, momentarily actuate CONV START switch. Test panel circuit breaker must not trip.

NOTE

If results obtained in (17) through (24) above are abnormal, proceed to paragraph 4—10.

(23) Stop equipment (para 5—5).

5-21. Converter Test (ITT Model 6484)

a. General. This bench test procedure is included to allow the depot repairman to perform a bench test on the converter once the converter has been repaired to see that it performs properly.

WARNING

When performing any maintenance procedures with converter on, be sure not to allow hands to come in contact with both banks of transistors at the same time. Dangerous voltages exist between the two banks.

b. Procedure.

(1) Connect the converter as shown in figure 4—10.

CAUTION

Be sure that S1 is open when the power supply is initially turned on. The power supply has a high output voltage when initially turned on. Allow about 5 minutes for this voltage to stabilize before closing S1.

(2) Check to see that S2 and S3 are open.

(3) Close S1.

(4) Check to see that voltage readings correspond to those listed in paragraph 4—11*b* for no-load conditions.

(5) Close S2 and S3.

(6) Observe that the voltage readings correspond to those listed in paragraph 4—11*b* for load conditions.

(7) If the observed voltages do not correspond to the voltages listed in paragraph 4—11*b*, refer to paragraph 4—11*c*.

CAUTION

The converter should not be operated at full load for more than 5 seconds in any 1-minute period. CB1 will actuate due to heat rise if this time is exceeded. No damage would result unless CB1 is bypassed. The converter can be operated for a longer period than 5 seconds if operated under no-load conditions.

5-22. Complete Searchlight Test (fig. 5—12)

a. General. After repair and checkout of indi-

vidual assemblies, verify the correct operation of the complete searchlight as follows:

b. Procedure.

(1) Perform preliminary procedures (para 5—4).

(2) On COMPLETE SEARCHLIGHT TEST PANEL, be sure POWER and SLT POWER switches are in OFF position.

(3) On COMPLETE SEARCHLIGHT TEST PANEL, turn MODE SWITCH to BLACKOUT.

(4) Remove control box from searchlight (universal mount only).

(5) Connect one end of searchlight test cable W7 (p/o AN/GSM—184) to input power receptacle on the searchlight.

(6) Connect other end of searchlight test cable W7 to 1A1J2 on COMPLETE SEARCHLIGHT TEST PANEL.

NOTE

Do not direct searchlight toward personnel. Looking into searchlight can cause eye damage.

(7) On COMPLETE SEARCHLIGHT TEST PANEL, set POWER switch to ON. POWER lamp on COMPLETE SEARCHLIGHT TEST PANEL must illuminate. If not, check test set input power and/or POWER lamp.

(8) On COMPLETE SEARCHLIGHT TEST PANEL, set SLT POWER switch to STANDBY. Blower motor B4 must operate. If not, set SLT POWER switch to OFF. Refer to paragraph 5—15 for blower motor test. If blower motor B4 operates, proceed as follows:

(9) Wait at least 10 minutes. Then, observe DC AMPS meter on COMPLETE SEARCHLIGHT TEST PANEL. DC AMPS meter must indicate 90 to 110 amperes.

(10) On COMPLETE SEARCHLIGHT TEST PANEL, set SLT POWER switch to ON.

(11) On COMPLETE SEARCHLIGHT TEST PANEL, turn MODE SWITCH to the different modes. Observe operation of drive motors 4A1B1, B2 and B3. Drive motors must go into the proper modes of operation as indicated by MODE SWITCH. If not, refer to paragraph 5—14 for drive motor test.

(12) On COMPLETE SEARCHLIGHT TEST PANEL, place MODE SWITCH to BLACKOUT.

(13) Connect test cable W6 (p/o AN/GSM—184) from 1A1J1 on COMPLETE SEARCHLIGHT TEST PANEL to 2A3J1 on TIMER PANEL.

(14) On TIMER PANEL, set INPUT POWER switch to ON.

(15) On TIMER PANEL, observe timer indication. If timer does not read zero, actuate TIMER RESET switch.

(16) On COMPLETE SEARCHLIGHT TEST PANEL, press OVERDRIVE lamp. OVERDRIVE lamp must illuminate.

WARNING

Do not let searchlight run in overdrive more than 20 seconds, as excessive heating may cause xenon lamp to explode.

(17) On COMPLETE SEARCHLIGHT TEST PANEL, momentarily lift up on spring-loaded OVERDRIVE switch. Observe OVERDRIVE lamp on COMPLETE SEARCHLIGHT TEST PANEL and timer on TIMER PANEL. OVERDRIVE lamp must illuminate and timer must indicate as follows:

(*a*) If test set is being operated from a 60-cps line, timer must read between 15.0 and 20.0 seconds.

(*b*) If test set is being operated from a 50-cps line, timer must read between 12.5 and 16.7 seconds.

(18) Allow searchlight to operate for at least 15 minutes at an ambient temperature between 60 and 70 degrees F.

(19) On COMPLETE SEARCHLIGHT TEST PANEL set SLT POWER switch to OFF. Check operation of blower motor B4. Blower motor B4 must continue to run for at least 3 minutes. If not, refer to paragraph 5—15.

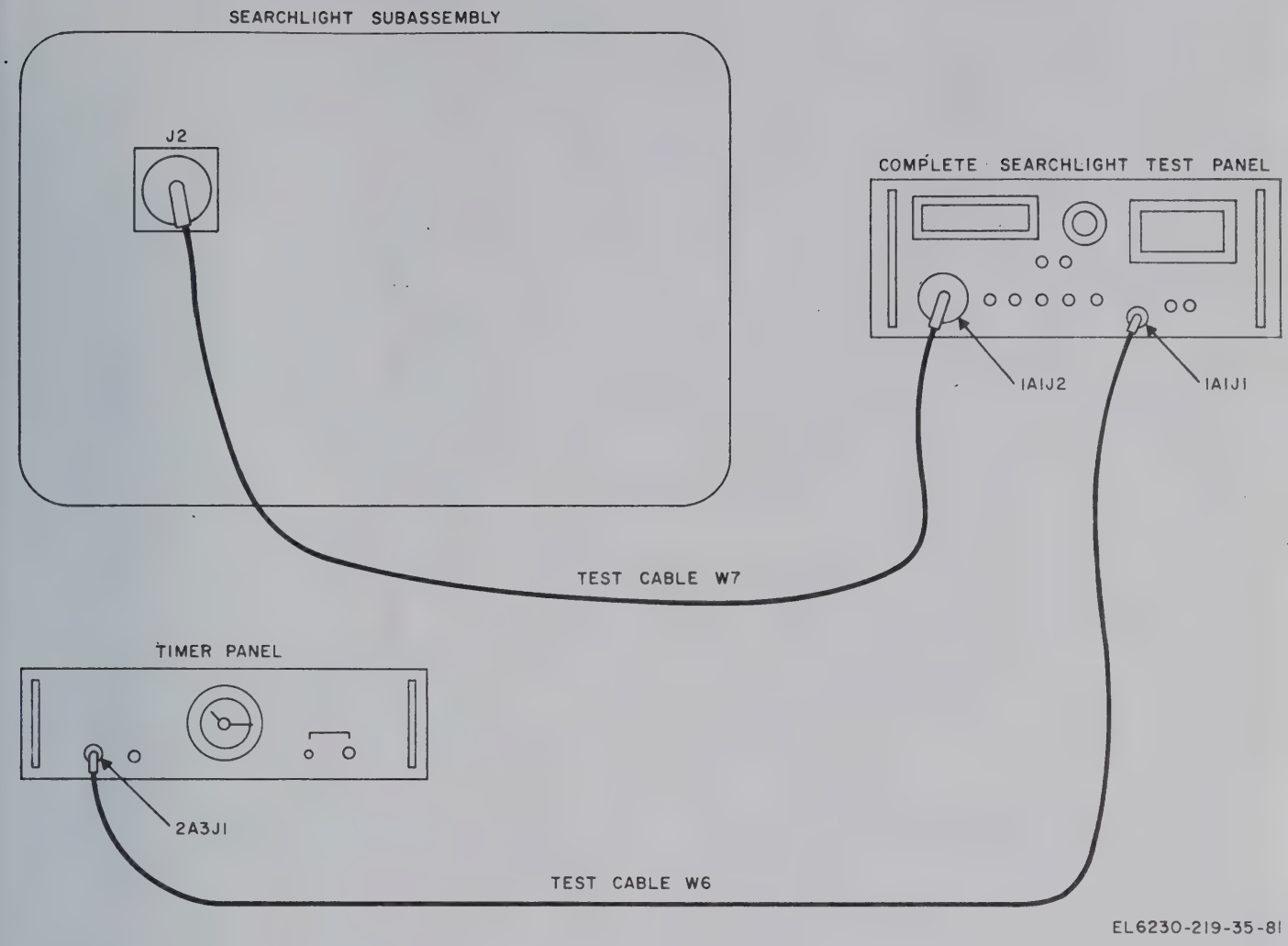


Figure 5—12. Complete searchlight test setup.

(20 Stop equipment (para 5—5).

5-23. Mount, Universal MT-3900/GSS-14 Test

Depot tests of the universal mount are identical to those contained in paragraph 3—63.

5-24. Mount, Searchlight MT-3900A/GSS-14 Test

Depot tests of the universal mount (A) are identical to those contained in paragraph 3—64.

5-25. Xenon Lamp Destruction Procedures (fig. 5—13)

Defective xenon lamps are destroyed at the depot level only. A destruct chamber similar to that shown in figure 5—13 is used to destroy defective lamps. Destruct chambers are locally constructed. Destroy defective xenon lamps as follows:

a. Remove the 6-in. pipe cap from the destruct chamber.

b. Carefully place the xenon lamp in the destruct chamber. (See fig. 5—13.)

c. Screw the 6-in. pipe cap onto the barrel of the destruct chamber.

d. Strike the plunger assembly with a 3-lb sledge hammer.

WARNINGS

1. The operator shall position himself

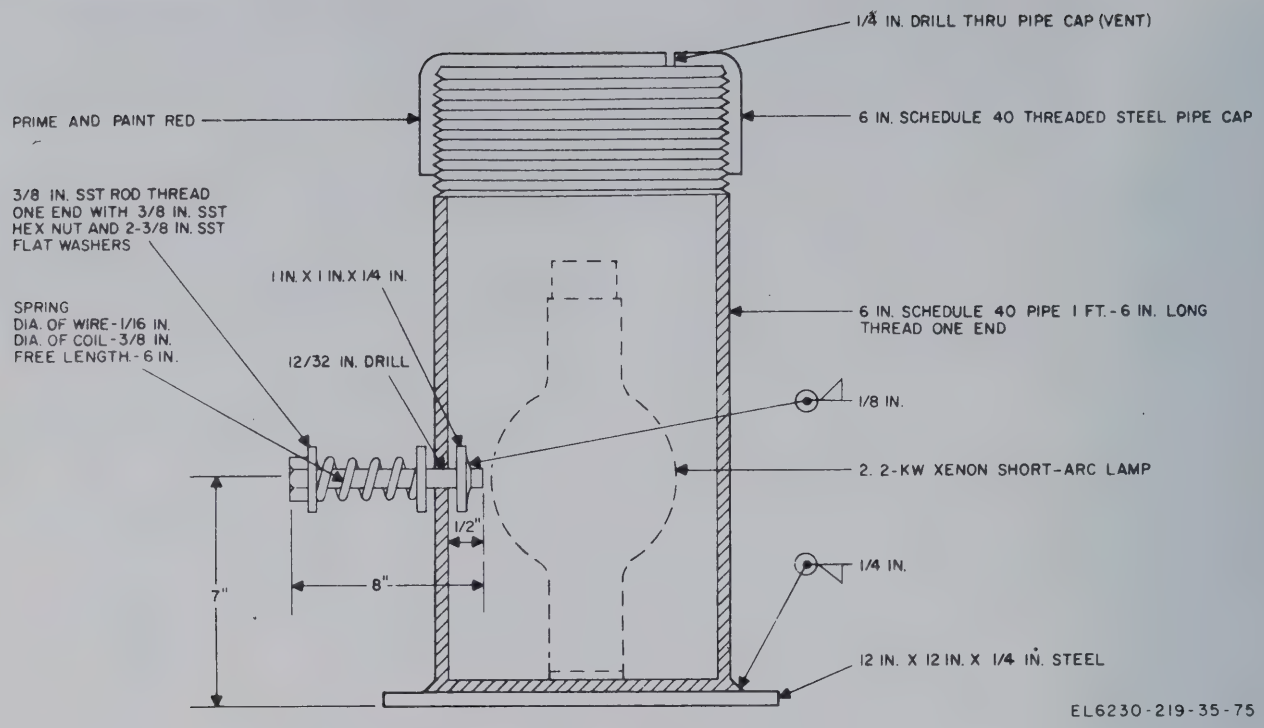


Figure 5—13. Xenon lamp destruct chamber.

so that his face does not appear directly over the vent hole.

2. Prior to striking the plunger assembly, the operator shall put on a face shield to protect face and eyes from minute quartz glass particles which could be blown through the vent hole.

e. Remove pipe cap, empty and dispose of contents.

CHAPTER 6

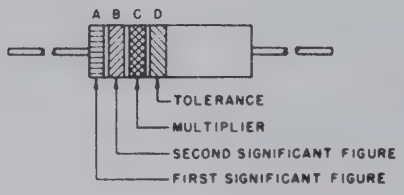
FINAL (FOLDOUT) ILLUSTRATIONS

The foldout illustrations located in this chapter are useful in troubleshooting and maintenance of the 2.2-kw, 23-inch xenon searchlight. These foldout illustrations pertain to resistor and capacitor color code charts, block, schematic, and wiring diagrams. A complete list of foldout illustrations follows.

Figure No.	*Title*
6-1	Color code marking for MIL-STD resistors
6-2	Color code marking for MIL-STD capacitors
6-3	AN/VSS-1, schematic diagram
6-4	AN/VSS-1A and AN/VSS-1C, schematic diagram
6-5	AN/VSS-1B, schematic diagram
6-6	AN/VSS-1D and AN/VSS-2, schematic diagram
6-7	AN/VSS-1E, schematic diagram
6-8	AN/GSS-14, AN/GSS-14A, AN/GSS-18, and AN/GSS-18A, schematic diagram
6-9	AN/GSS-14B, AN/GSS-18B, schematic diagram
6-10	AN/VSS-1 mode control circuits, simplified schematic diagram
6-11	AN/GSS-14 and AN/GSS-18, mode control circuits, simplified schematic diagram
6-12	AN/VSS-1A through AN/VSS-1E and AN/VSS-2 mode control circuits, simplified schematic diagram
6-13	Searchlight, Subassembly MX-7884/VSS-1, wiring diagram
6-14	Searchlight, Subassemblies MX-7884A/VSS-1 through MX-7884E/VSS-1, MX-8004/VSS-2, MX-7883/GSS-14, MX-7883A/GSS-14, MX-8525/GSS-18, and MX-8525A/GSS-18, wiring diagram.
6-15	Control Box C-7164/GSS-14 and Mount MT-3900A/GSS-14, wiring diagram.
6-16	Converter assembly (Varo model 9948), wiring diagram
6-17	Converter assembly (ITT model 6484), wiring diagram
6-18	Mount, Universal MT-3900/GSS-14, exploded view

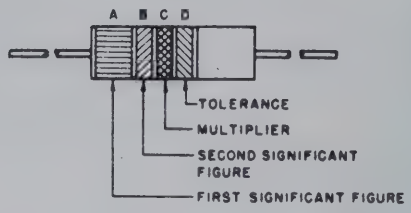
COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS

COMPOSITION-TYPE RESISTORS



BAND A— Equal Width Band Signifies Composition-Type

WIREWOUND-TYPE RESISTORS

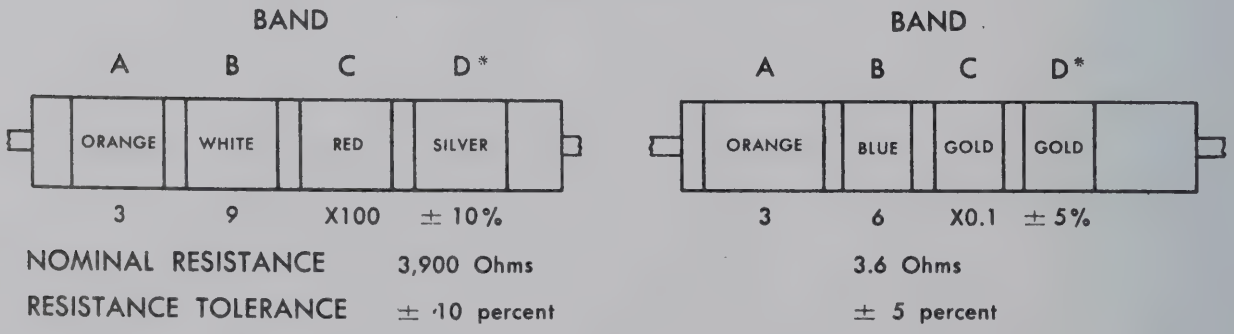


BAND A— Double Width Signifies Wire-wound Resistor

COLOR CODE TABLE

BAND A		BAND B		BAND C		BAND D*	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)
BLACK	0	BLACK	0	BLACK	1		
BROWN	1	BROWN	1	BROWN	10		
RED	2	RED	2	RED	100		
ORANGE	3	ORANGE	3	ORANGE	1,000		
YELLOW	4	YELLOW	4	YELLOW	10,000	SILVER	± 10
GREEN	5	GREEN	5	GREEN	100,000	GOLD	± 5
BLUE	6	BLUE	6	BLUE	1,000,000		
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7				
GRAY	8	GRAY	8	SILVER	0.01		
WHITE	9	WHITE	9	GOLD	0.1		

EXAMPLES OF COLOR CODING



STD-R2

*If Band D is omitted, the resistor tolerance is ±20%, and the resistor is not Mil-Std.

Figure 6–1. Color code marking for MIL–STD resistors.

COLOR CODE TABLES

CB

TANCE TOLERANCE			CHARACTERISTIC[2]				DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
CN	CY	CB	CM	CN	CY	CB	CM	CM	CM
	± 20%	± 20%		A				−55° to +70°C	10–55 cps
			B	E		B			
	± 2%	± 2%	C		C			−55° to +85°C	
30%			D			D	300		
			E					−55° to +125°C	10–2,000 cps
			F				500		
								−55° to +150°C	
	± 5%	± 5%							
10%	± 10%	± 10%							

CK

TABLE III – For use with Group III, Temperature Compensating, Style CC

CITANCE RANGE	MIL ID
± 20%	.
± 10%	
	CK

COLOR	TEMPERATURE COEFFICIENT[4]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					Capacitances over 10uuf	Capacitances 10uuf or less	
BLACK	0	0	0	1		± 2.0uuf	CC
BROWN	−30	1	1	10	± 1%		
RED	−80	2	2	100	± 2%	± 0.25uuf	
ORANGE	−150	3	3	1,000			
YELLOW	−220	4	4				
GREEN	−330	5	5		± 5%	± 0.5uuf	
BLUE	−470	6	6				
PURPLE (VIOLET)	−750	7	7				
GREY		8	8	0.01			
WHITE		9	9	0.1	± 10%		
GOLD	+100					± 1.0uuf	
SILVER							

G) figures are multiplied to obtain the capacitance in uuf.

specifications: MIL–C–5, MIL–C–91, MIL–C–11272 and MIL–C–10950 respectively.

ure limits designated in MIL–C–11015.

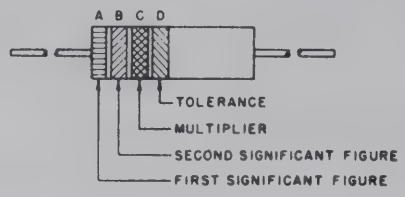
grade.

STD–C2

Figure 6–2. Color code marking for MIL–STD capacitors.

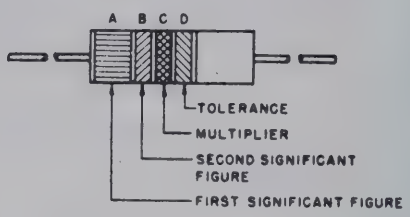
COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS

COMPOSITION-TYPE RESISTORS



BAND A— Equal Width Band Signifies Composition-Type

WIREWOUND-TYPE RESISTORS

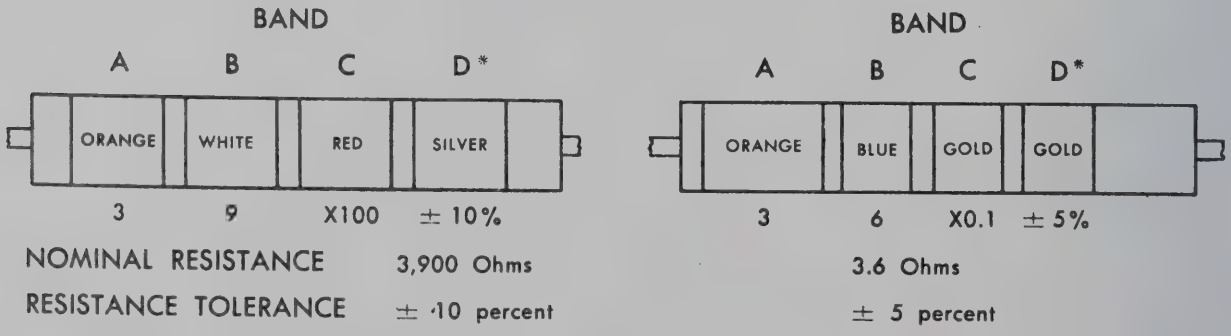


BAND A— Double Width Signifies Wire-wound Resistor

COLOR CODE TABLE

BAND A		BAND B		BAND C		BAND D*	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)
BLACK	0	BLACK	0	BLACK	1		
BROWN	1	BROWN	1	BROWN	10		
RED	2	RED	2	RED	100		
ORANGE	3	ORANGE	3	ORANGE	1,000		
YELLOW	4	YELLOW	4	YELLOW	10,000	SILVER	± 10
GREEN	5	GREEN	5	GREEN	100,000	GOLD	± 5
BLUE	6	BLUE	6	BLUE	1,000,000		
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7				
GRAY	8	GRAY	8	SILVER	0.01		
WHITE	9	WHITE	9	GOLD	0.1		

EXAMPLES OF COLOR CODING

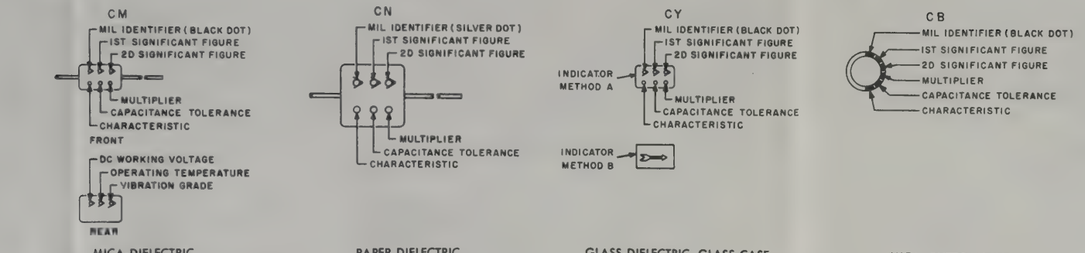


*If Band D is omitted, the resistor tolerance is ±20%, and the resistor is not Mil-Std.

Figure 6—1. Color code marking for MIL—STD resistors.

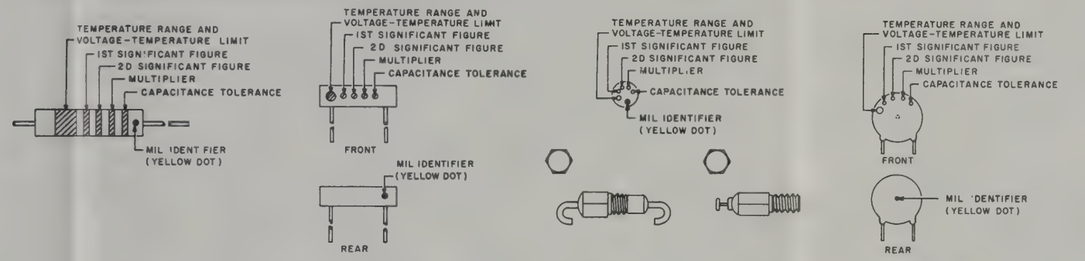
COLOR CODE MARKING FOR MILITARY STANDARD CAPACITORS

GROUP I Capacitors, Fixed, Various-Dielectrics, Styles CM, CN, CY, and CB



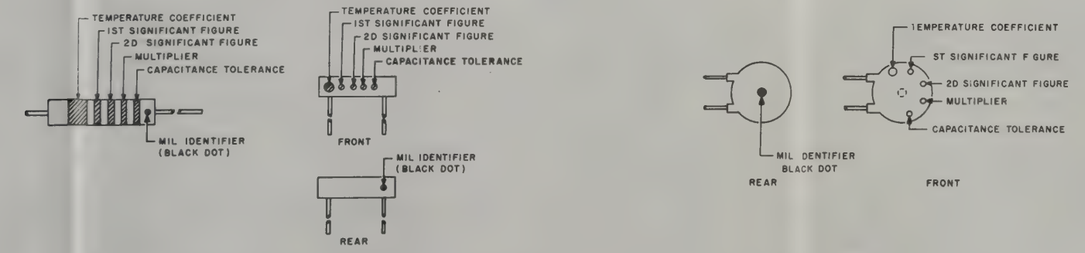
MICA-DIELECTRIC | PAPER-DIELECTRIC | GLASS-DIELECTRIC, GLASS CASE | MICA, BUTTON TYPE

GROUP II Capacitors, Fixed Ceramic-Dielectric (General Purpose) Style CK



AXIAL LEAD | RADIAL LEAD | FEED-THROUGH | STAND-OFF | DISK-TYPE

GROUP III Capacitors, Fixed, Ceramic-Dieletric (Temperature Compensating) Style CC



AXIAL LEAD | RADIAL LEAD | DISK-TYPE

COLOR CODE TABLES

TABLE I – For use with Group I, Styles CM, CN, CY and CB

COLOR	MIL ID	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE				CHARACTERISTIC[2]				DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CY	CB	CM	CM	CM
BLACK	CM, CY CB	0	0	1			± 20%	± 20%		A				−55° to +70°C	10–55 cps
BROWN		1	1	10					B	E		B			
RED		2	2	100	± 2%		± 2%	± 2%	C		C			−55° to +85°C	
ORANGE		3	3	1,000		± 30%			D			D	300		
YELLOW		4	4	10,000					E					−55° to +125°C	10–2,000 cps
GREEN		5	5		± 5%				F				500		
BLUE		6	6											−55° to +150°C	
PURPLE (VIOLET)		7	7												
GREY		8	8												
WHITE		9	9												
GOLD				0.1			± 5%	± 5%							
SILVER	CN				± 10%	± 10%	± 10%	± 10%							

TABLE II – For use with Group II, General Purpose, Style CK

COLOR	TEMP. RANGE AND VOLTAGE – TEMP. LIMITS[3]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE	MIL ID
BLACK		0	0	1	± 20%	
BROWN	AW	1	1	10	± 10%	
RED	AX	2	2	100		
ORANGE	BX	3	3	1,000		
YELLOW	AV	4	4	10,000		CK
GREEN	CZ	5	5			
BLUE	BV	6	6			
PURPLE (VIOLET)		7	7			
GREY		8	8			
WHITE		9	9			
GOLD						
SILVER						

TABLE III – For use with Group III, Temperature Compensating, Style CC

COLOR	TEMPERATURE COEFFICIENT[4]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					Capacitances over 10uuf	Capacitances 10uuf or less	
BLACK	0	0	0	1		± 2.0uuf	CC
BROWN	−30	1	1	10	± 1%		
RED	−80	2	2	100	± 2%	± 0.25uuf	
ORANGE	−150	3	3	1,000			
YELLOW	−220	4	4				
GREEN	−330	5	5		± 5%	± 0.5uuf	
BLUE	−470	6	6				
PURPLE (VIOLET)	−750	7	7				
GREY		8	8	0.01			
WHITE		9	9	0.1	± 10%		
GOLD	+100					± 1.0uuf	
SILVER							

1. The multiplier is the number by which the two significant (SIG) figures are multiplied to obtain the capacitance in uuf.
2. Letters indicate the Characteristics designated in applicable specifications: MIL–C–5, MIL–C–91, MIL–C–11272 and MIL–C–10950 respectively.
3. Letters indicate the temperature range and voltage-temperature limits designated in MIL–C–11015.
4. Temperature coefficient in parts per million per degree centigrade.

STD-C2

Figure 6–2. Color code marking for MIL–STD capacitors.

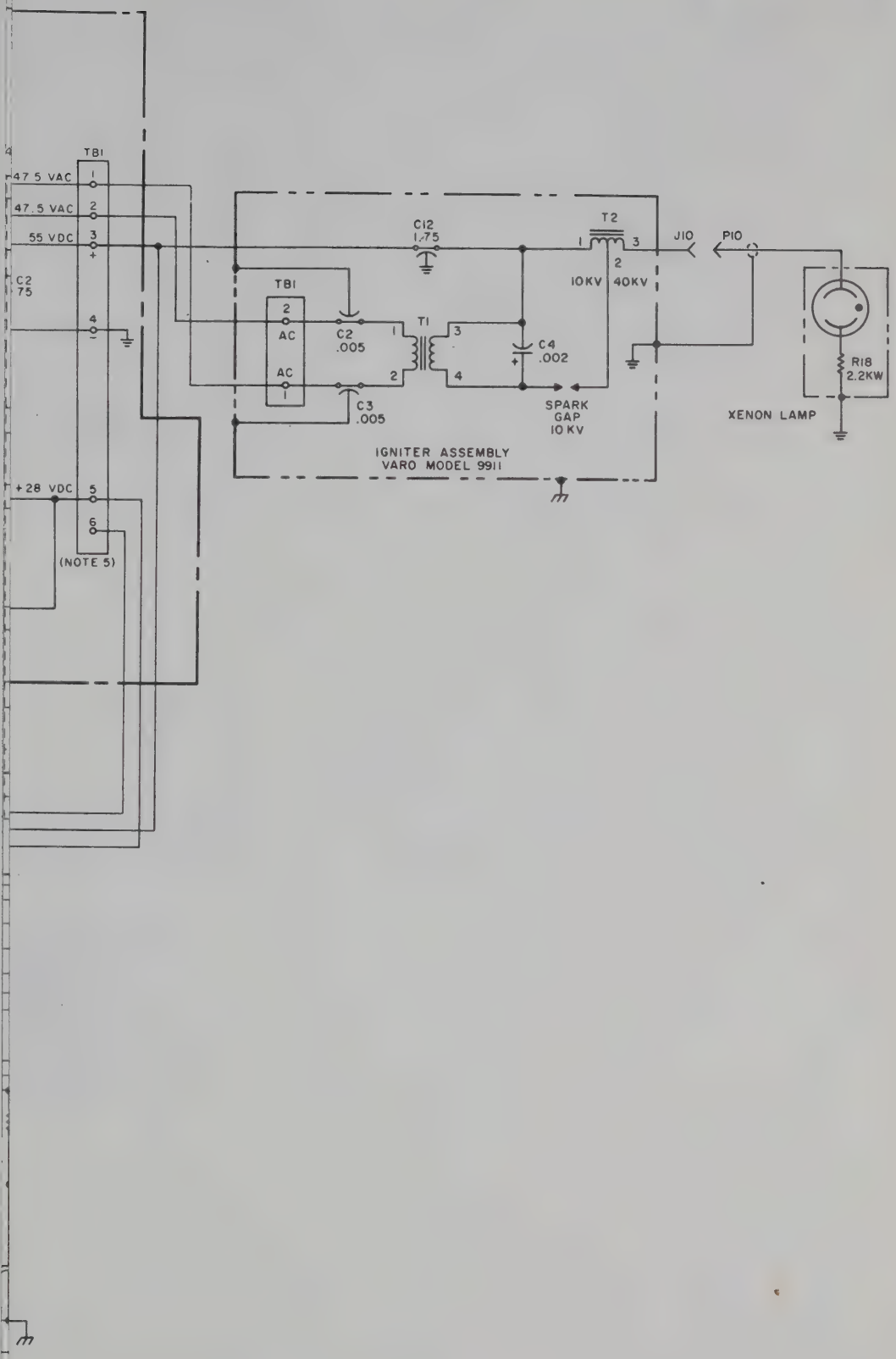
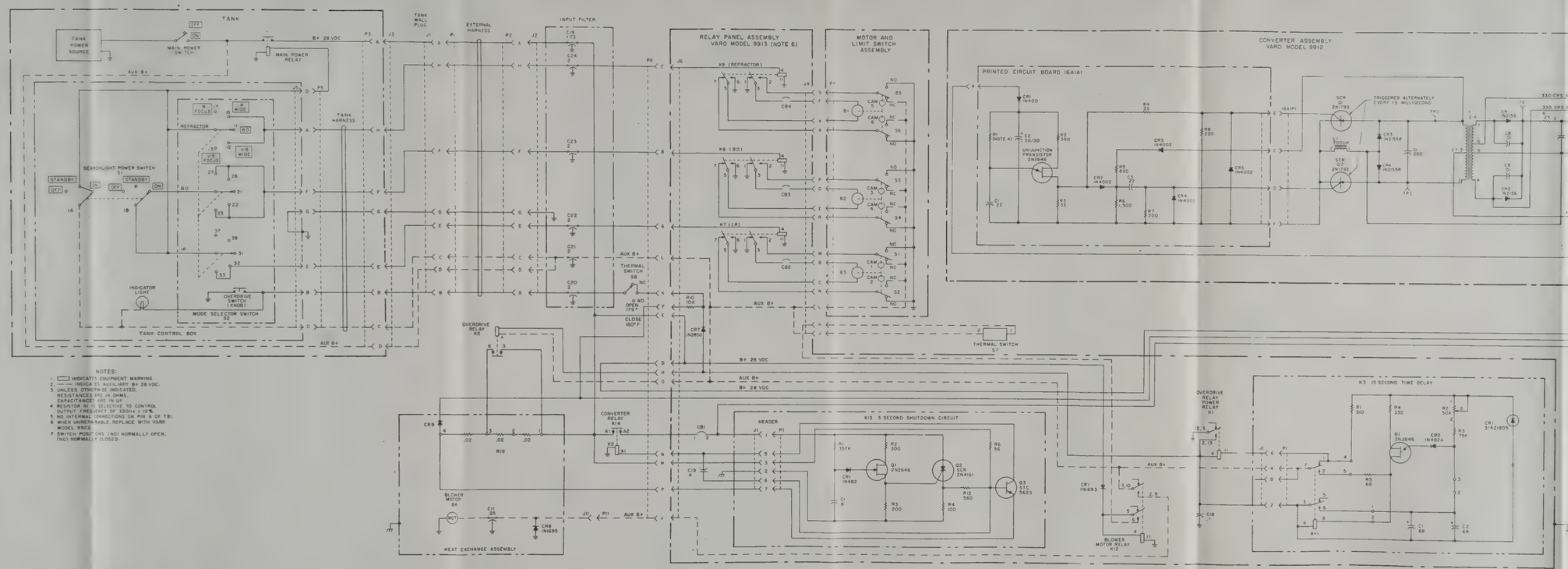


Figure 6—3. AN/VSS—1, schematic diagram.



NOTES:
1. ▭ INDICATES EQUIPMENT MARKING.
2. —— INDICATES AUXILIARY B+ 28 VDC.
3. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS; CAPACITANCES ARE IN UF.
4. RESISTOR R1 IS SELECTIVE TO CONTROL OUTPUT FREQUENCY OF 330Hz ± 10%.
5. NO INTERNAL CONNECTIONS ON PIN 8 OF TB1.
6. WHEN UNREPAIRABLE, REPLACE WITH VARO MODEL 9922.
7. SWITCH POSITIONS (NO) NORMALLY OPEN, (NC) NORMALLY CLOSED.

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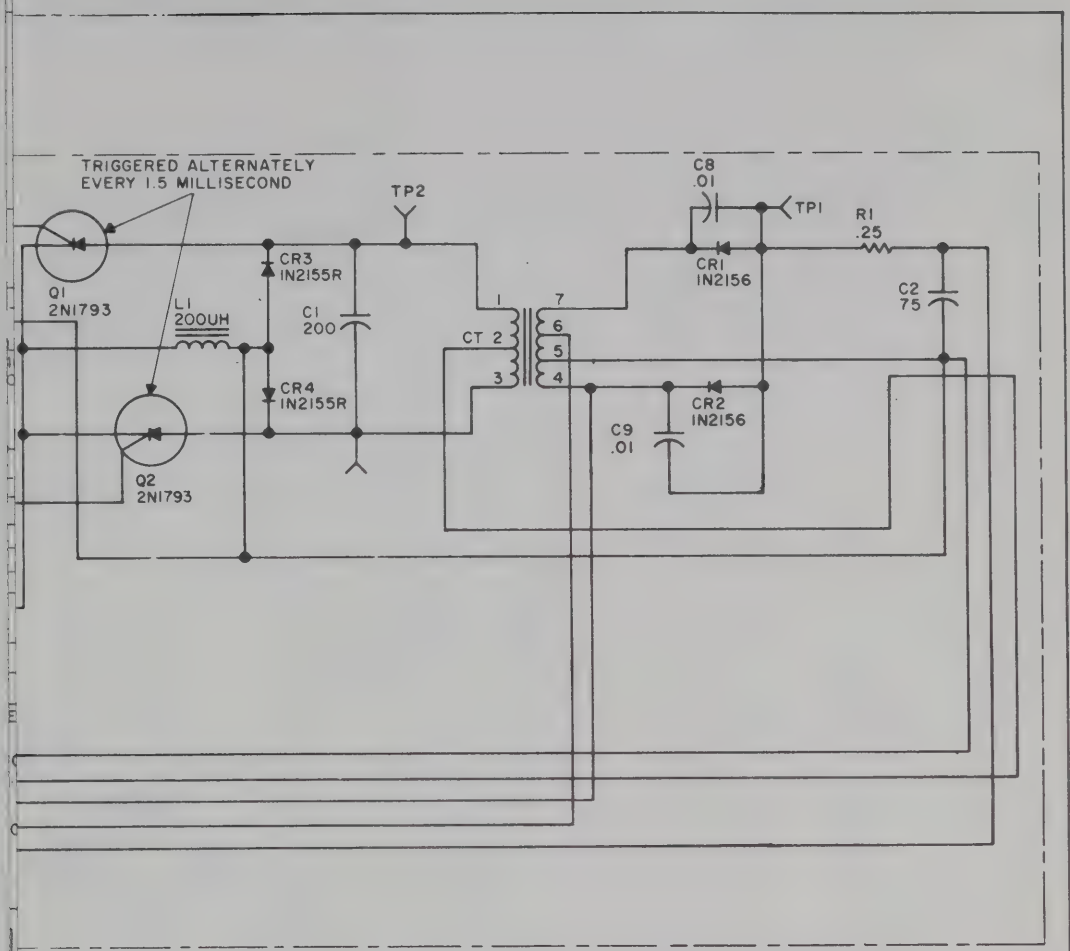
Figure 6–3. AN/VSS–1, schematic diagram.



NOTES

1. UNLESS OTHERWISE INDICATED RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN MICROFARADS.
2. [ ] INDICATES EQUIPMENT MARKING.
3. DRIVE MOTOR LIMIT SWITCHES AND CONTROL RELAYS ARE SHOWN IN BLACKOUT MODE.
4. AN/VSS-1A USES RELAY PANEL ASSEMBLY VARO MODEL 9922, SEARCHLIGHT, SUBASSEMBLY MX-7884A/VSS-1, CONVERTER ASSEMBLY VARO MODEL 9912 AND VARO MODEL 9911 IGNITER.
5. ON RELAY PANEL ASSEMBLY VARO MODEL 9922, PINS P AND C MAY BE REVERSED, PINS R AND E MAY BE REVERSED, AND PINS S AND H MAY BE REVERSED.
6. SELECTED TO PRODUCE OUTPUT OF 330HZ (NORMALLY 5100-6200 OHMS.)

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Figure 6—4. AN/VSS—1A and AN/VSS—1C, schematic diagram.

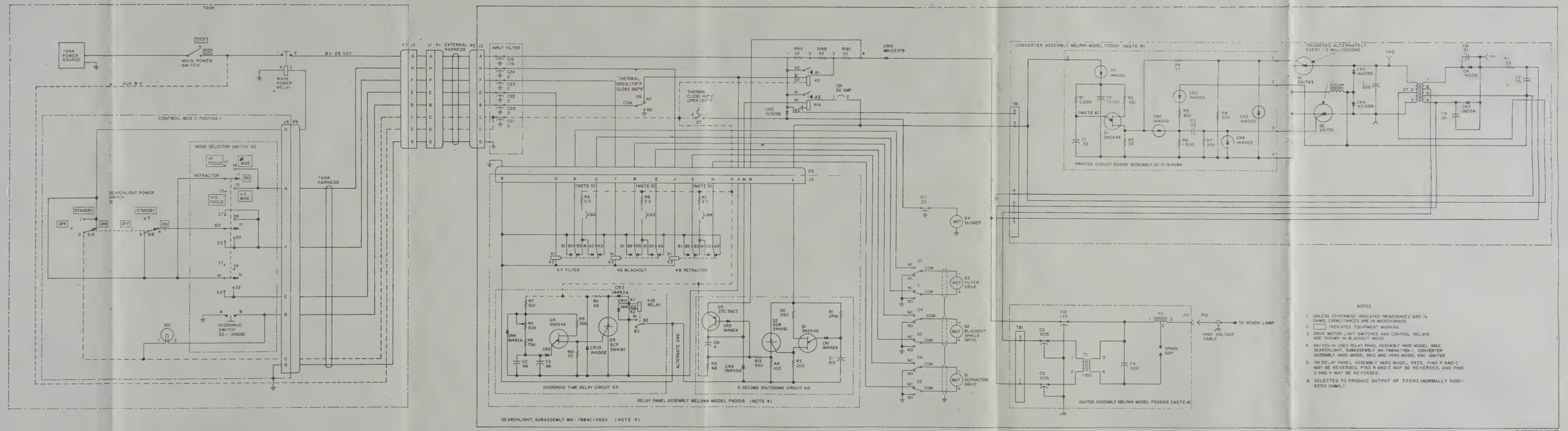
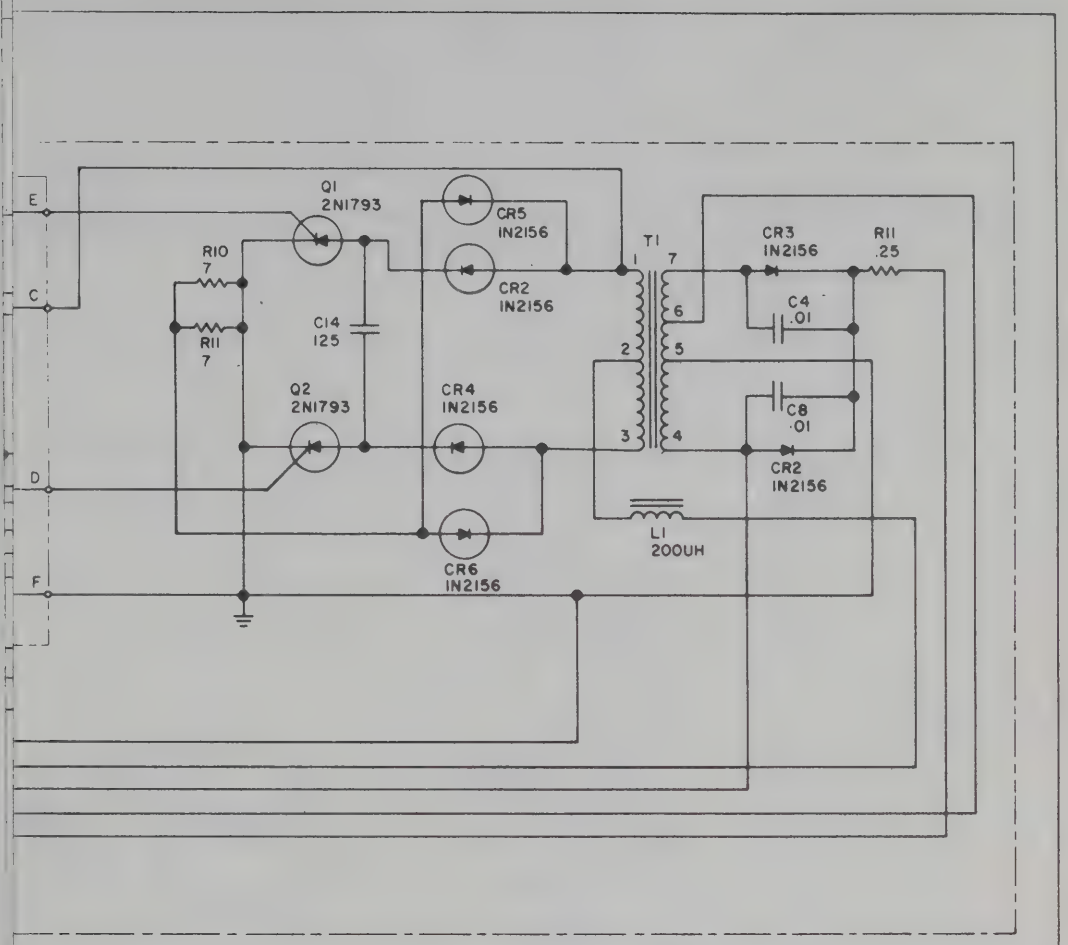


Figure 6-4. AN/VSS-1A and AN/VSS-1C, schematic diagram.



NOTES:

1. UNLESS OTHERWISE INDICATED RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN MICROFARADS.
2. ☐ INDICATES EQUIPMENT MARKING.
3. DRIVE MOTOR LIMIT SWITCHES AND CONTROL RELAYS ARE SHOWN IN BLACKOUT MODE

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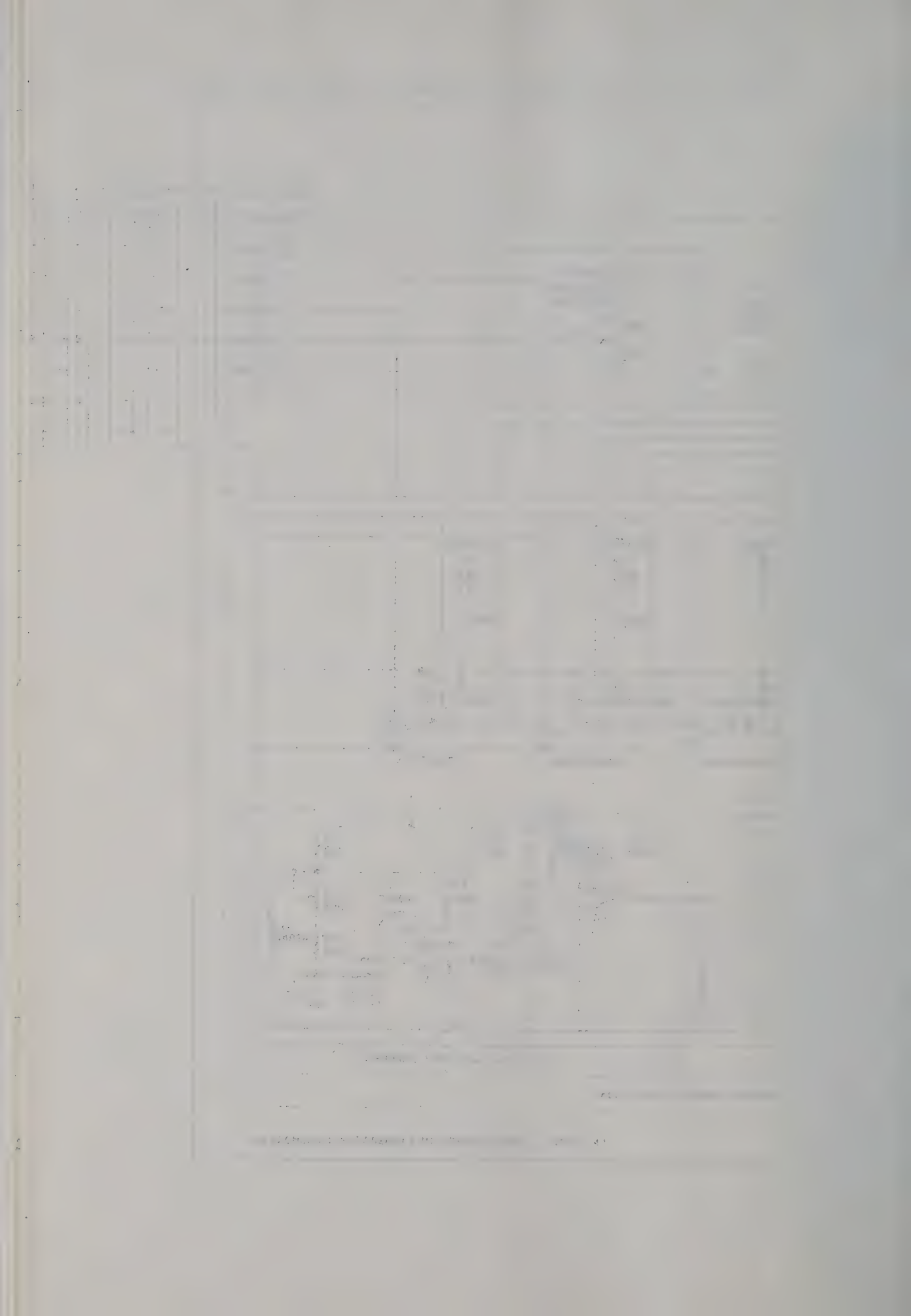
Figure 6—5. AN/VSS—1B, schematic diagram.



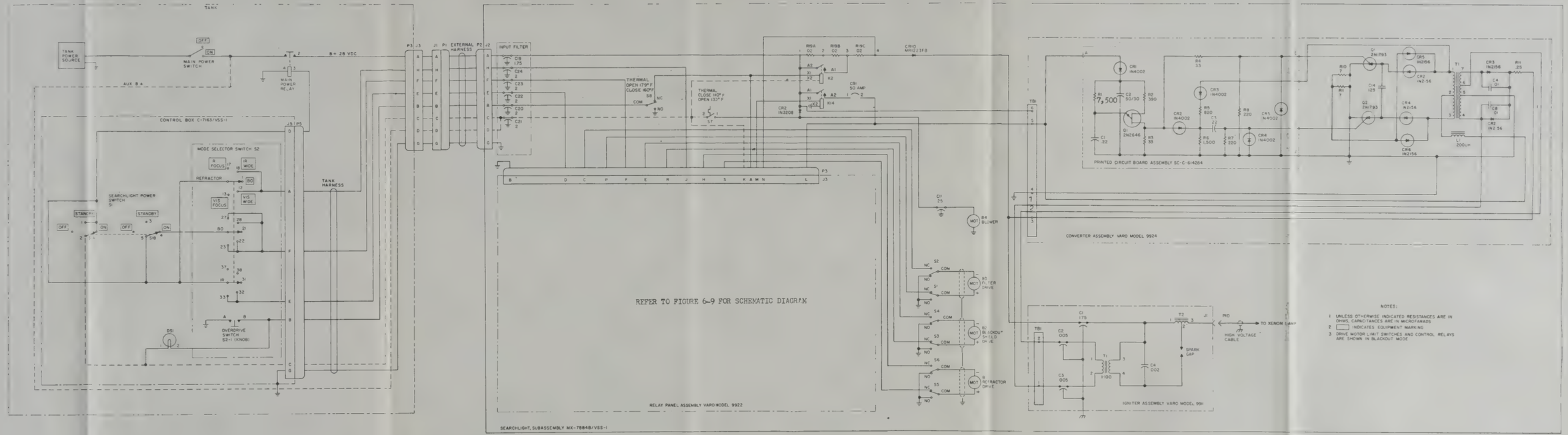
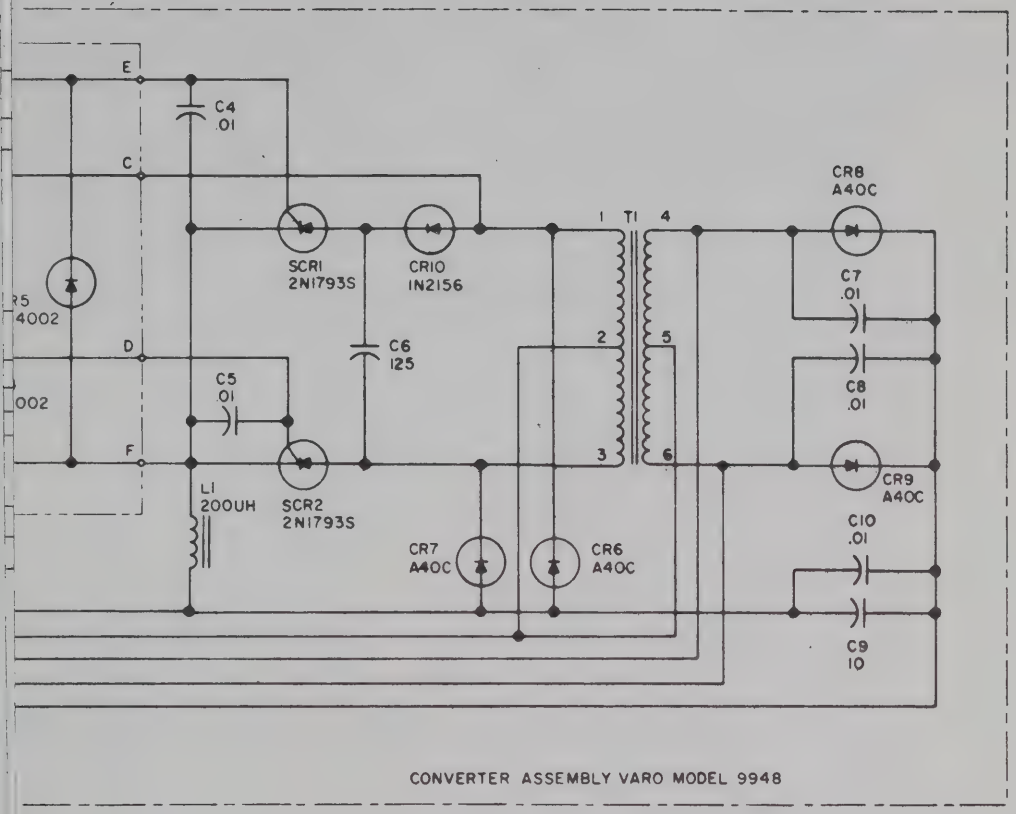


Figure 6-5 AN/VSS-1B schematic diagram



XENON LAMP

NOTES:

1. UNLESS OTHERWISE INDICATED RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN MICROFARADS.
2. ▭ INDICATES EQUIPMENT MARKING.
3. DRIVE MOTOR LIMIT SWITCHES AND CONTROL RELAYS ARE SHOWN IN BLACKOUT MODE.
4. AN/VSS-2 USES SEARCHLIGHT, SUBASSEMBLY MX-8004/VSS-2. A PINK FILTER IS USED INSTEAD OF IR FILTER.
5. SELECTED TO PRODUCE OUTPUT OF 330HZ (NORMALLY 5,100 - 6,200 OHMS)

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Figure 6—6. AN/VSS—1D and AN/VSS—2, schematic diagram.

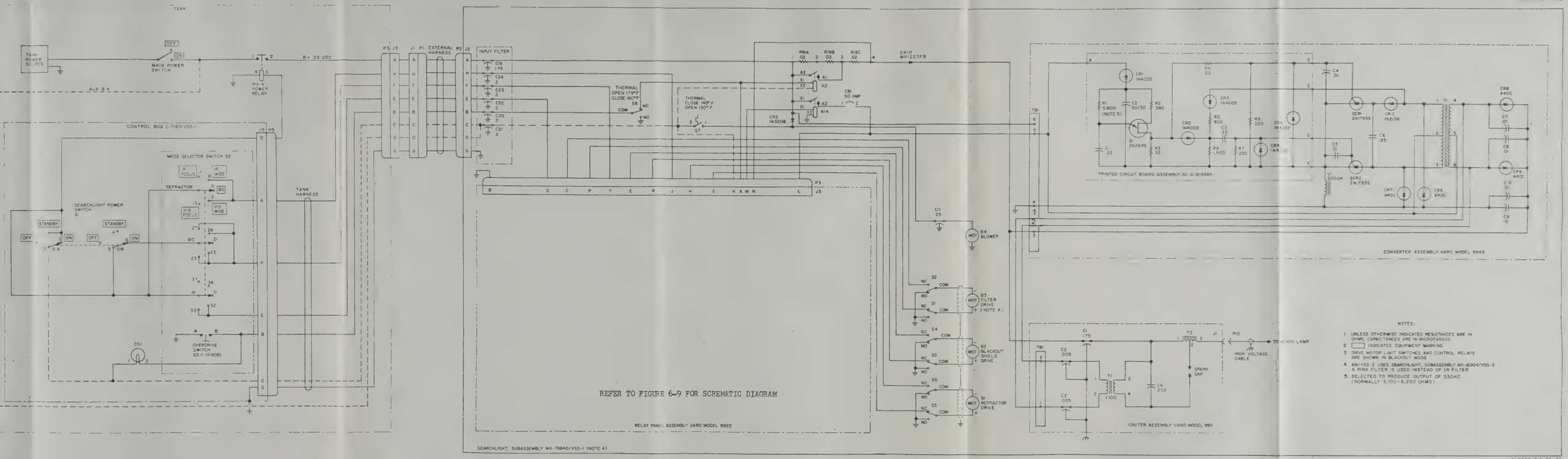

Figure 6-6. AN/VSS-1D and AN/VSS-2, schematic diagram

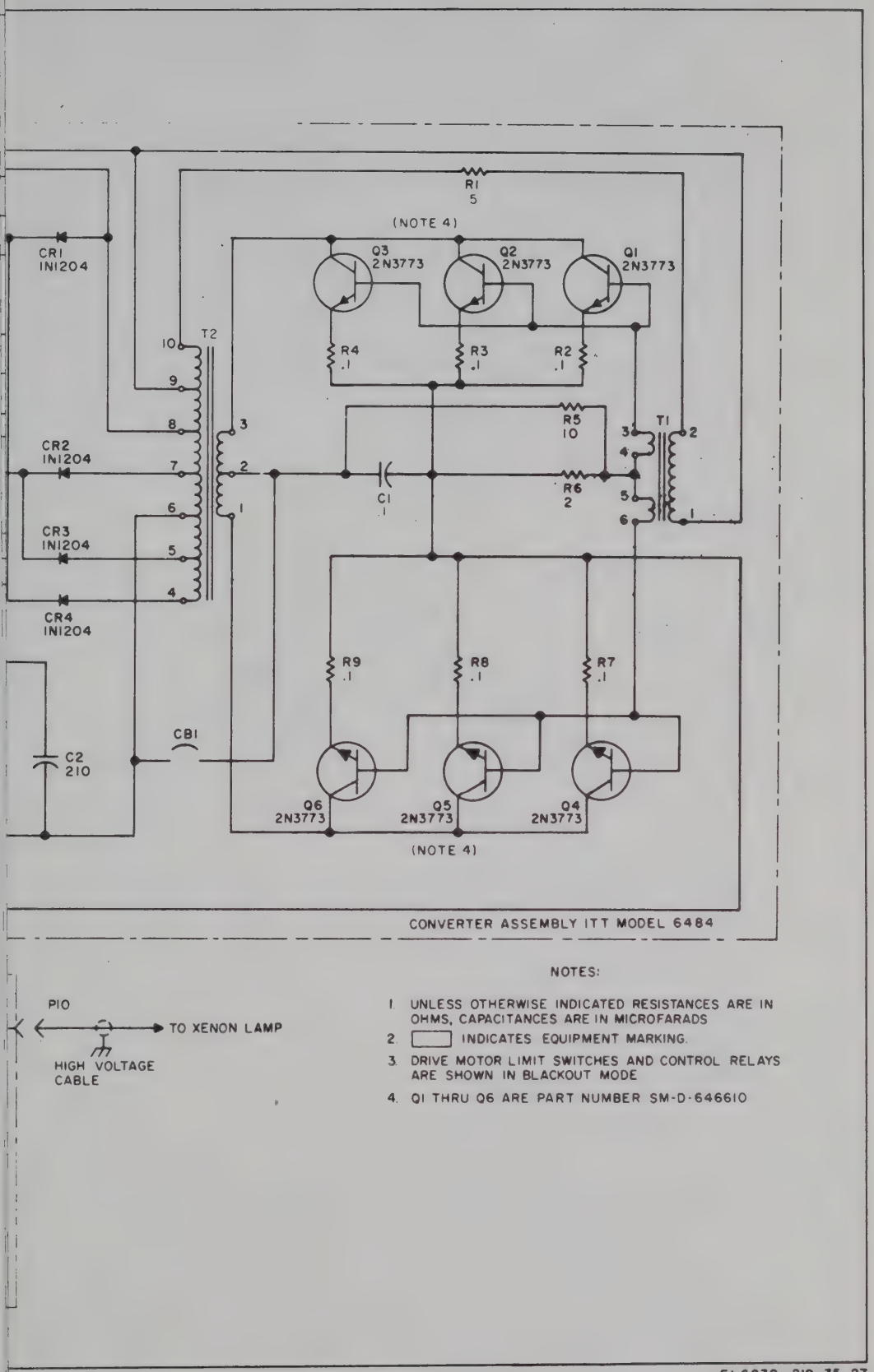

Figure 6—7. AN/VSS—1E, schematic diagram.

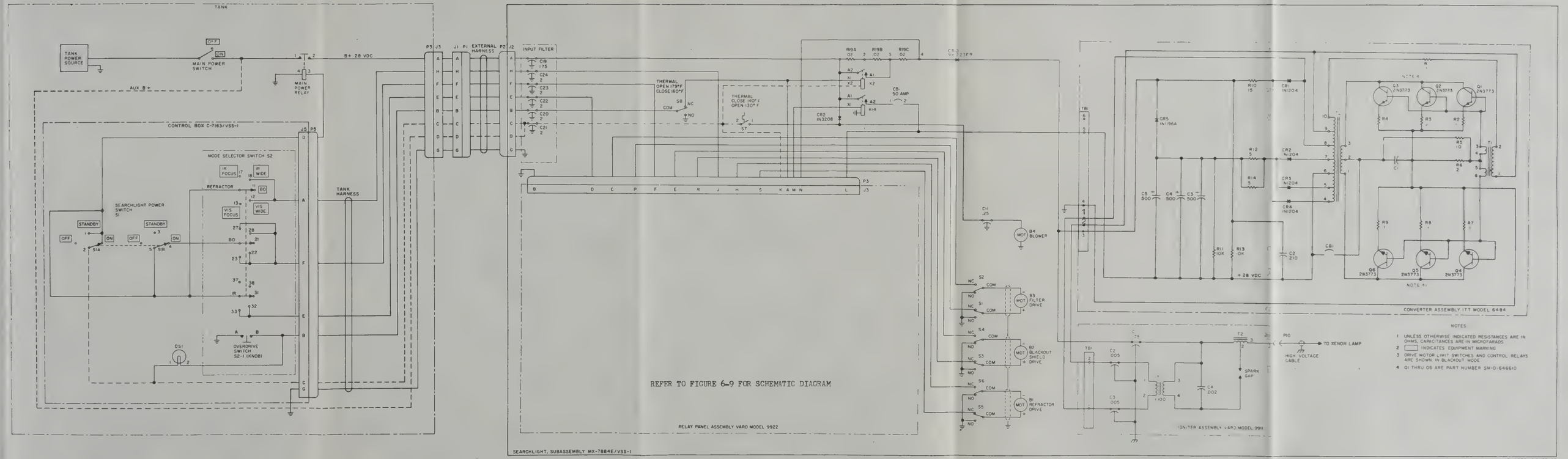

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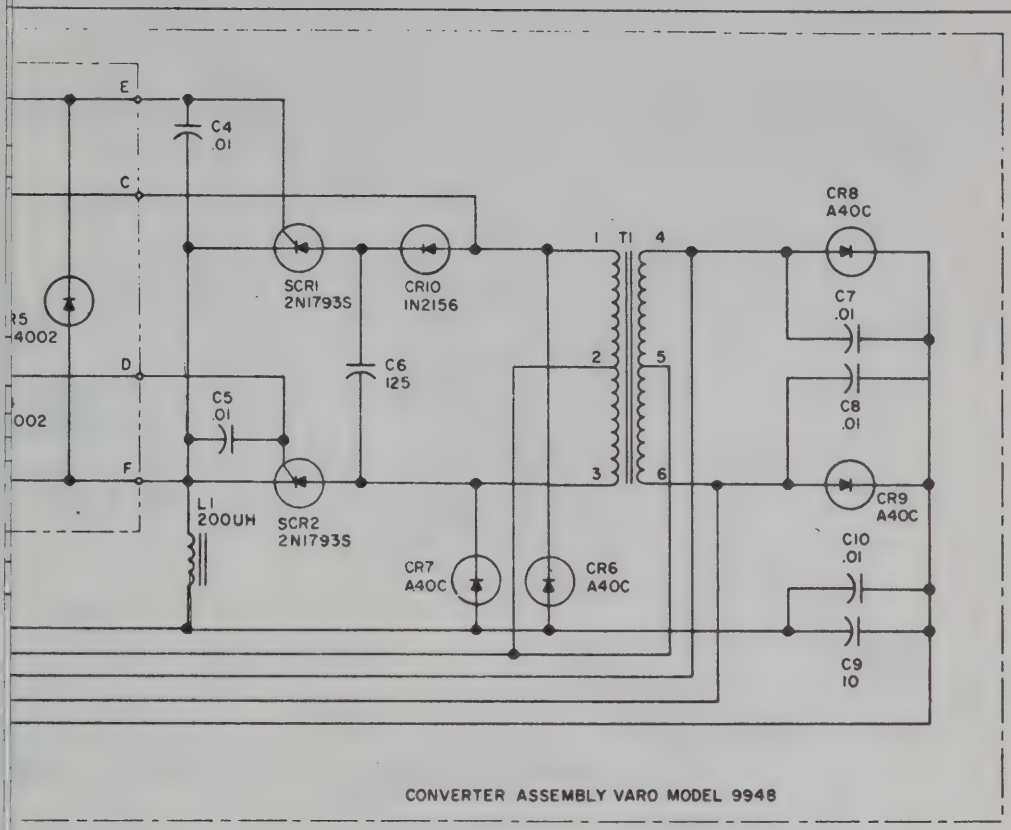
Figure 6-7. AN/VSS-1E, schematic diagram



NOTES:

1. UNLESS OTHERWISE INDICATED RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN MICROFARADS.
2. ▭ INDICATES EQUIPMENT MARKING.
3. DRIVE MOTOR LIMIT SWITCHES AND CONTROL RELAYS ARE SHOWN IN BLACKOUT MODE.
4. AN/GSS-14 AND AN/GSS-18 USE UNIVERSAL MOUNT MT-3900/GSS-14.
5. SELECTED TO PRODUCE OUTPUT OF 330HZ (NORMALLY 5100-6200 OHMS)
6. AN/GSS-18 AND AN/GSS-18A USE SEARCHLIGHT, SUBASSEMBLY MX-8525/GSS-18. A PINK FILTER IS USED INSTEAD OF IR FILTER.

) XENON LAMP

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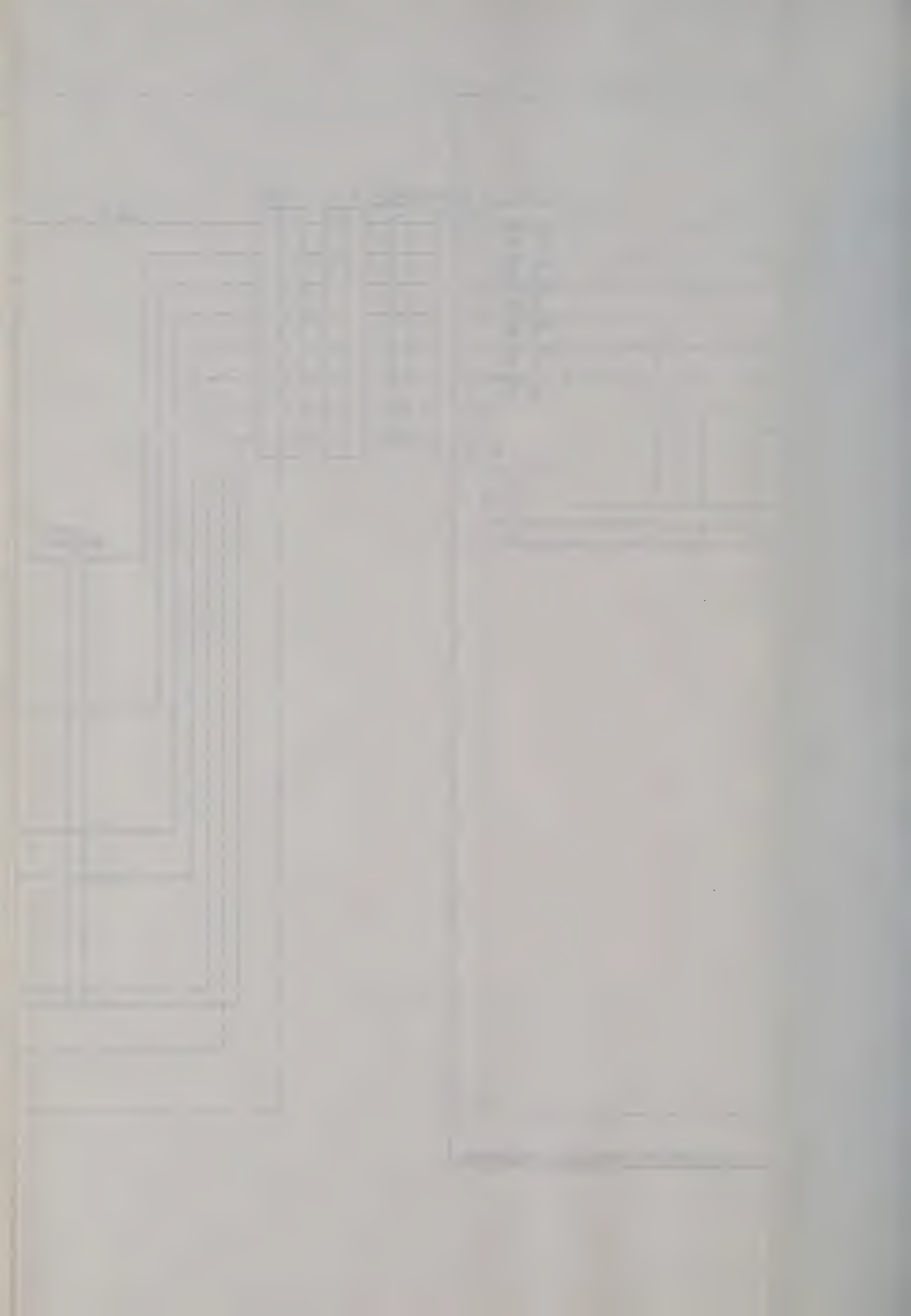
AN/GSS—14, AN/GSS—14A, AN/GSS—18, and AN/GSS—18A, schematic diagram.



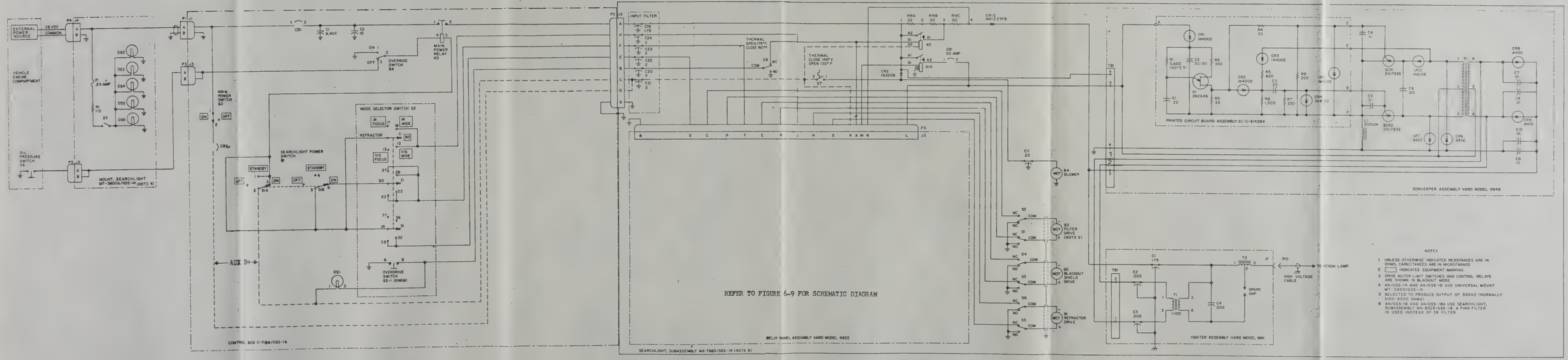


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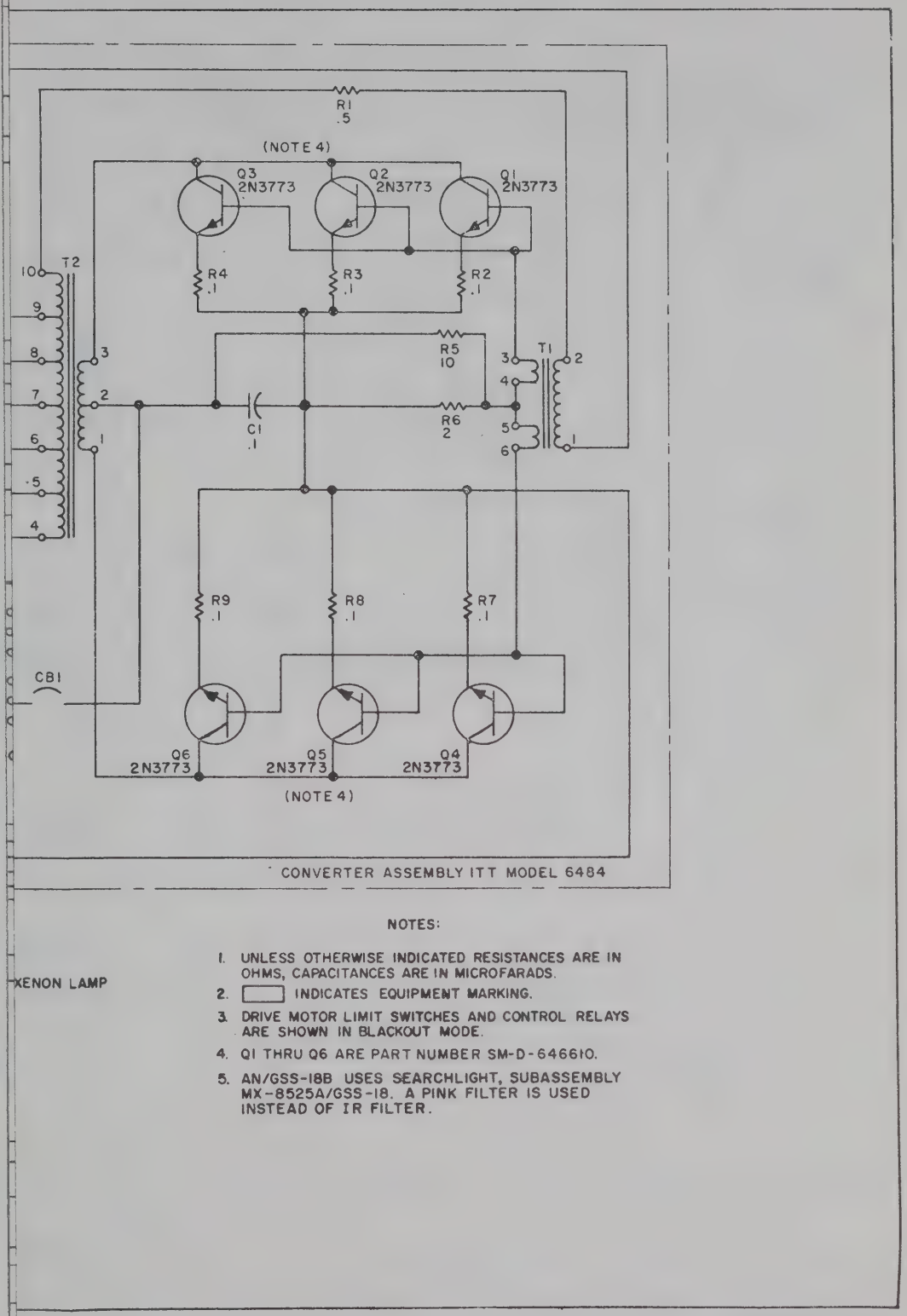
Figure 6-8. AN/GSS-14, AN/GSS-14A, AN/GSS-18, and AN/GSS-18A, schematic diagram.



NOTES:

1. UNLESS OTHERWISE INDICATED RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN MICROFARADS.
2. [ ] INDICATES EQUIPMENT MARKING.
3. DRIVE MOTOR LIMIT SWITCHES AND CONTROL RELAYS ARE SHOWN IN BLACKOUT MODE.
4. Q1 THRU Q6 ARE PART NUMBER SM-D-646610.
5. AN/GSS-18B USES SEARCHLIGHT, SUBASSEMBLY MX-8525A/GSS-18. A PINK FILTER IS USED INSTEAD OF IR FILTER.

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Figure 6—9. AN/GSS—14B and AN/GSS—18B, schematic diagram.

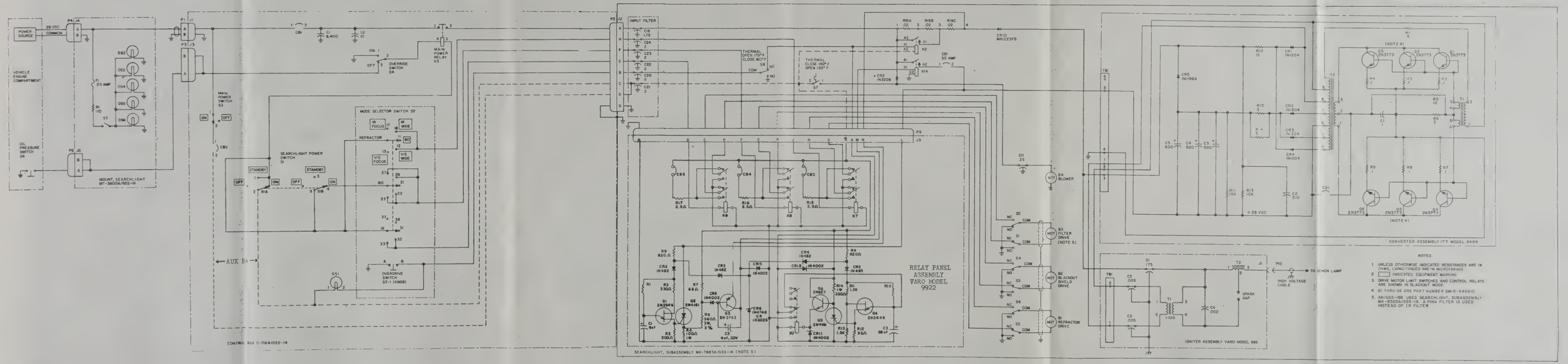


Figure 6-9. AN/GSS-14B and AN/GSS-18B, schematic diagram.

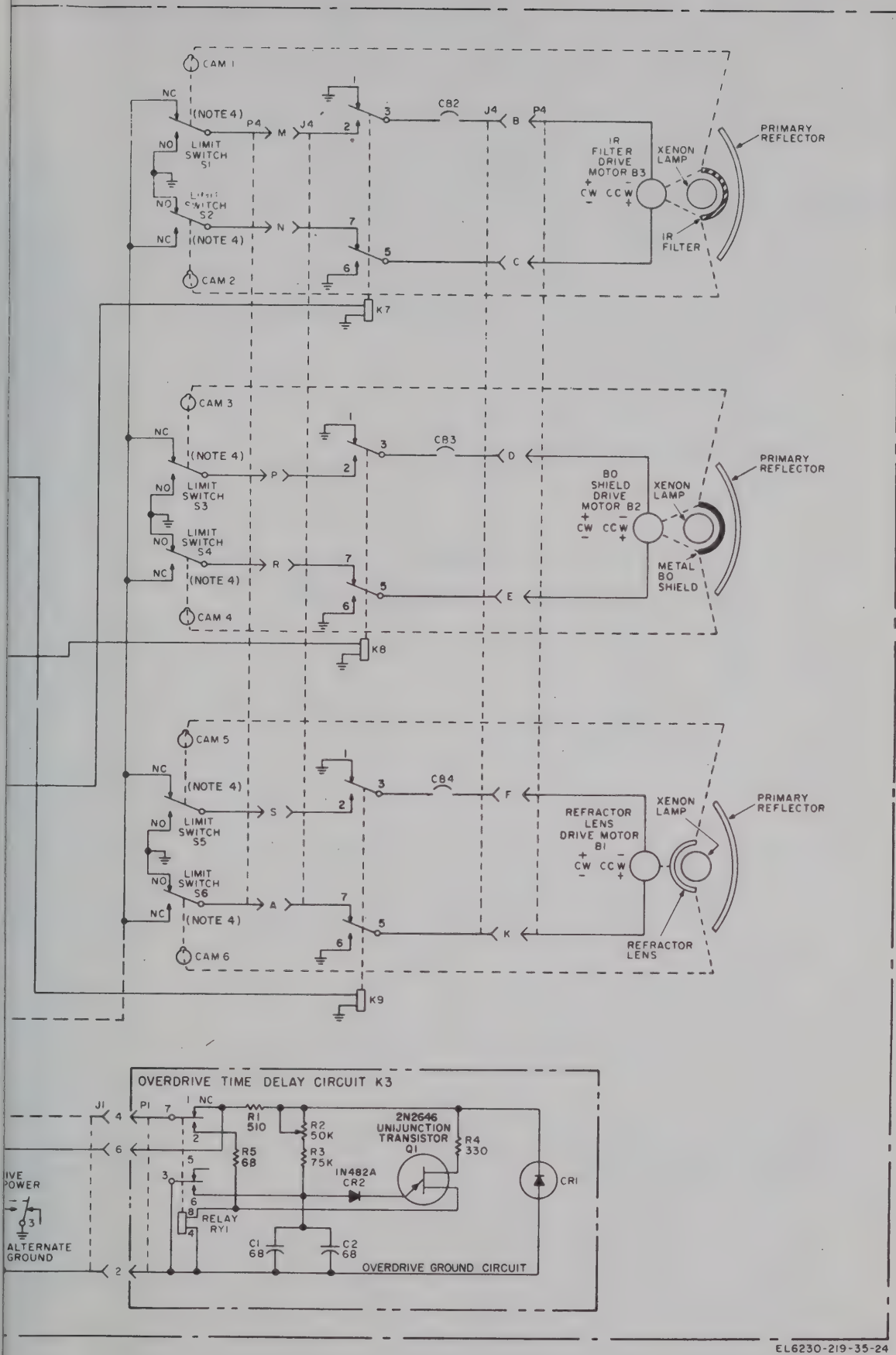
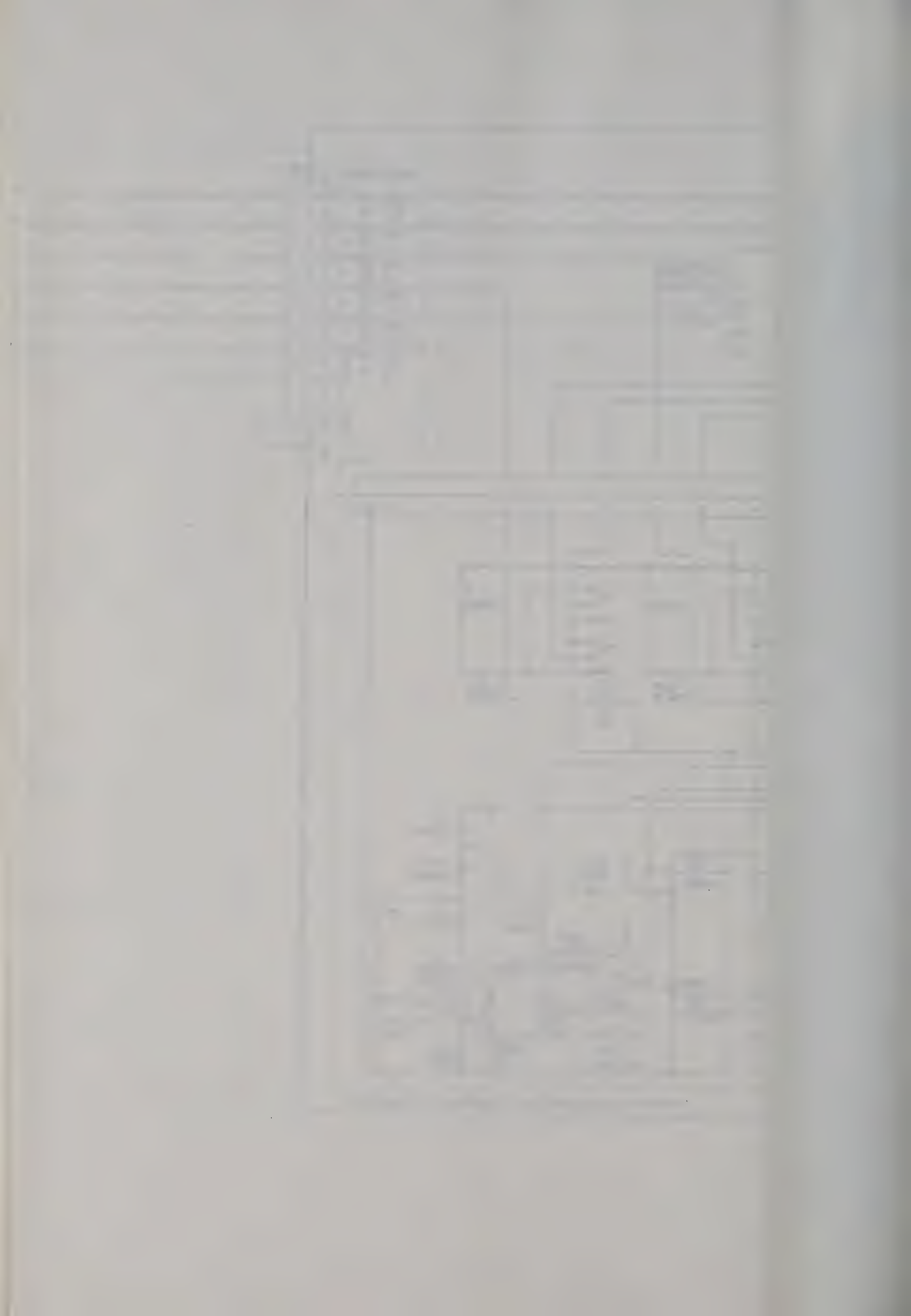
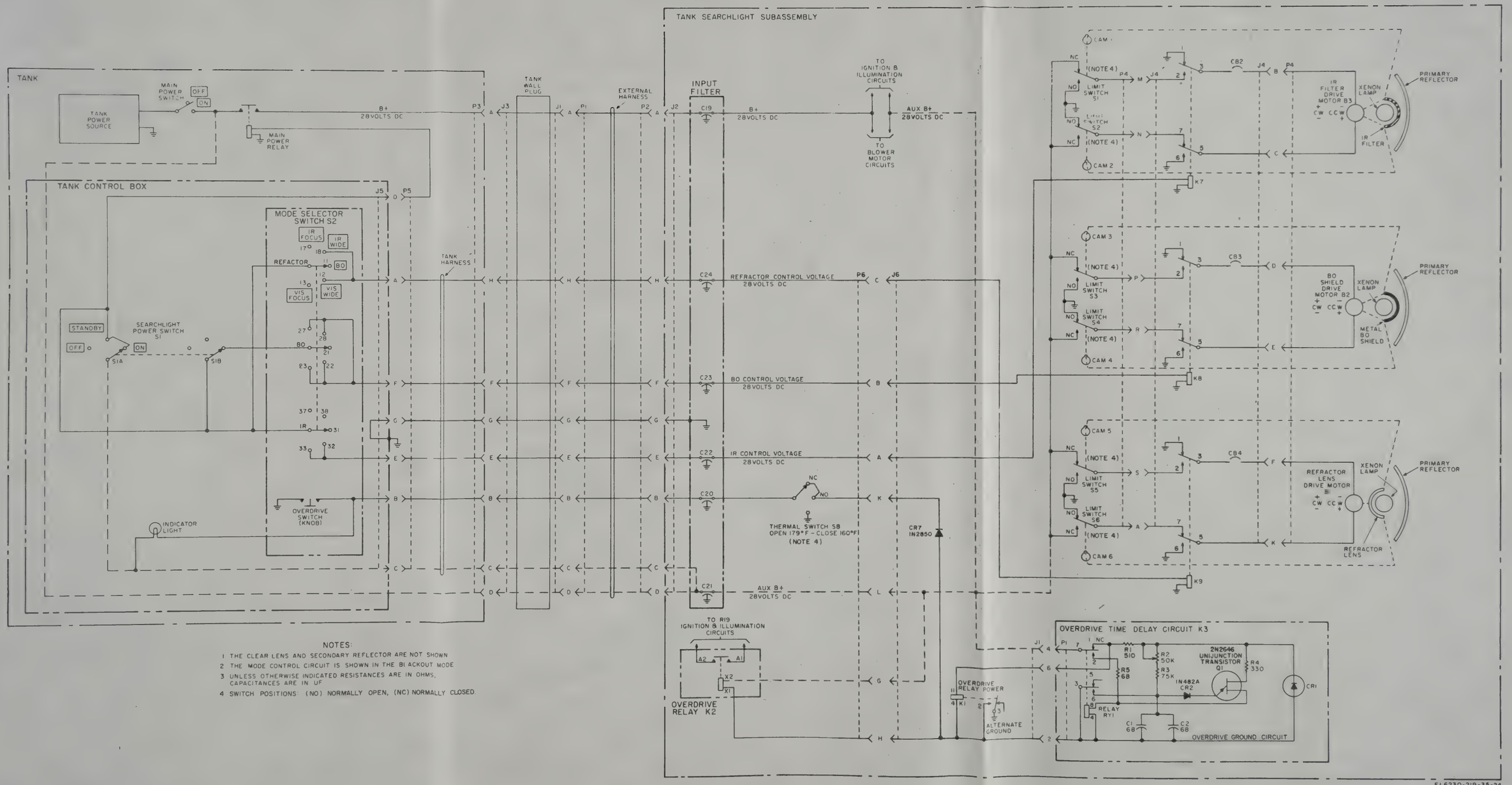


Figure 6—10. AN/VSS—1 mode control circuits, simplified schematic diagram.





NOTES:

1 THE CLEAR LENS AND SECONDARY REFLECTOR ARE NOT SHOWN
2 THE MODE CONTROL CIRCUIT IS SHOWN IN THE BLACKOUT MODE
3 UNLESS OTHERWISE INDICATED RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UF
4 SWITCH POSITIONS: (NO) NORMALLY OPEN, (NC) NORMALLY CLOSED.

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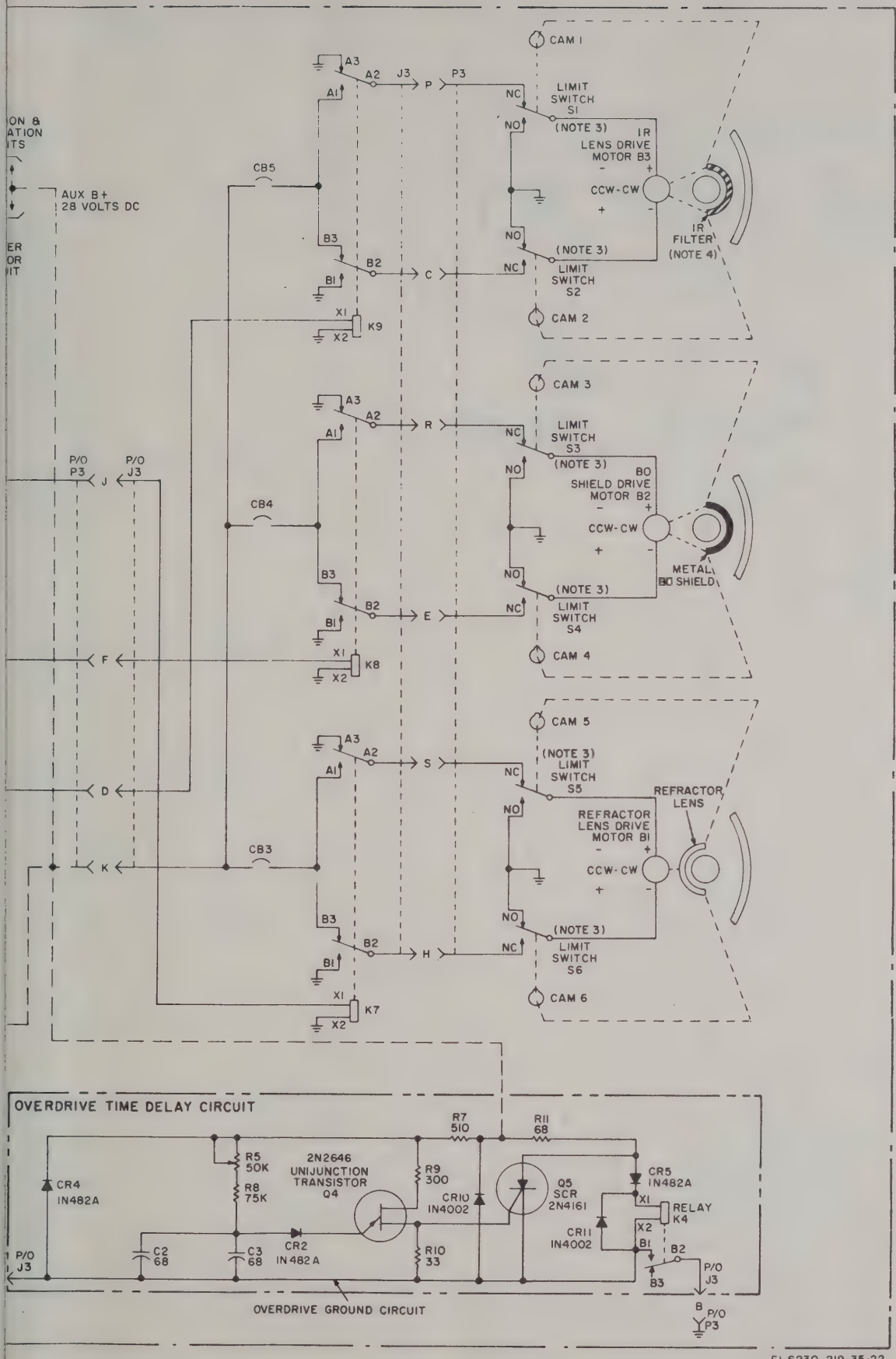
Figure 6—10. AN/VSS—1 mode control circuits, simplified schematic diagram.



6—11. AN/GSS—14 and AN/GSS—18, mode control circuits, simplified schematic diagram.

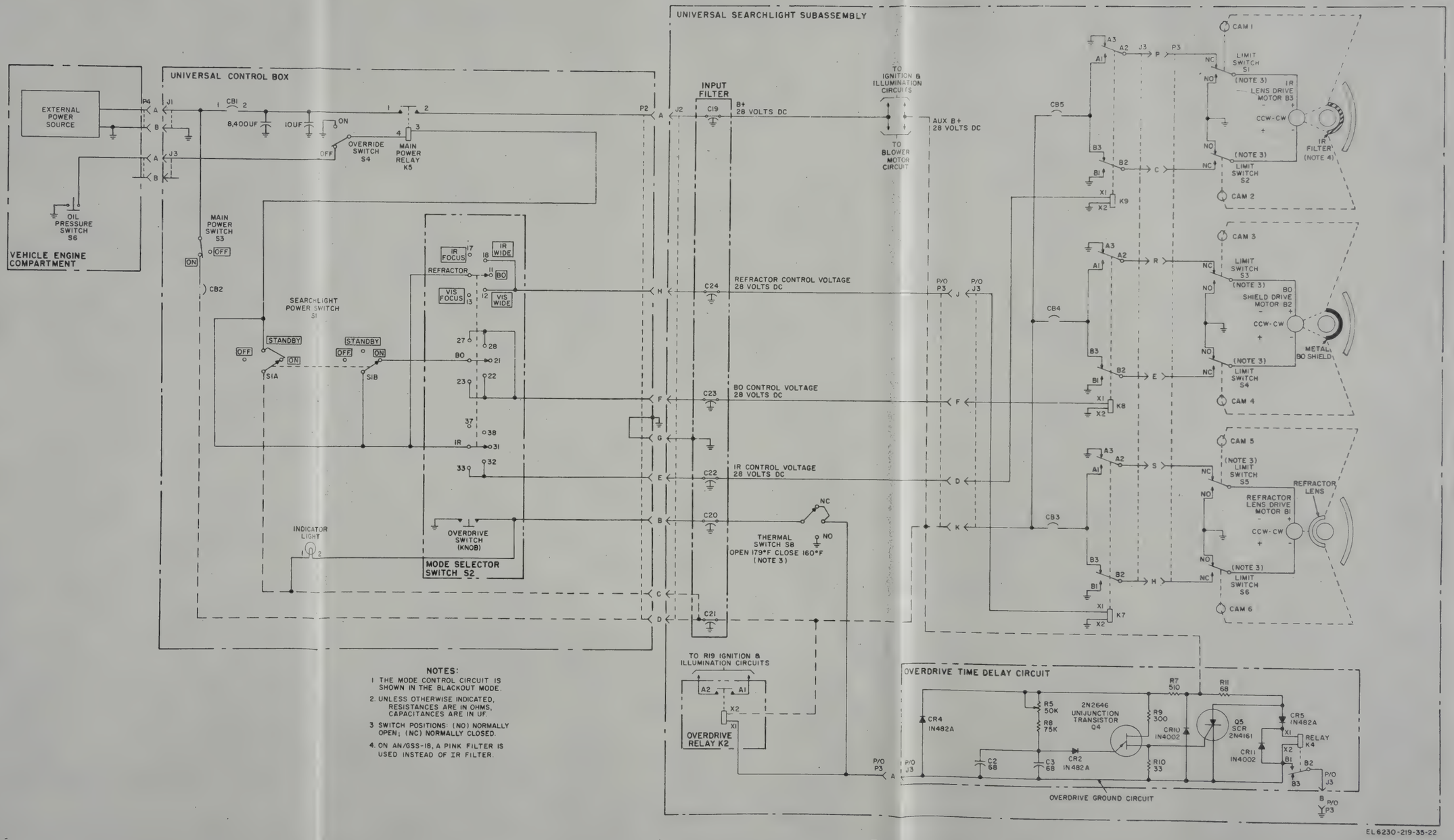
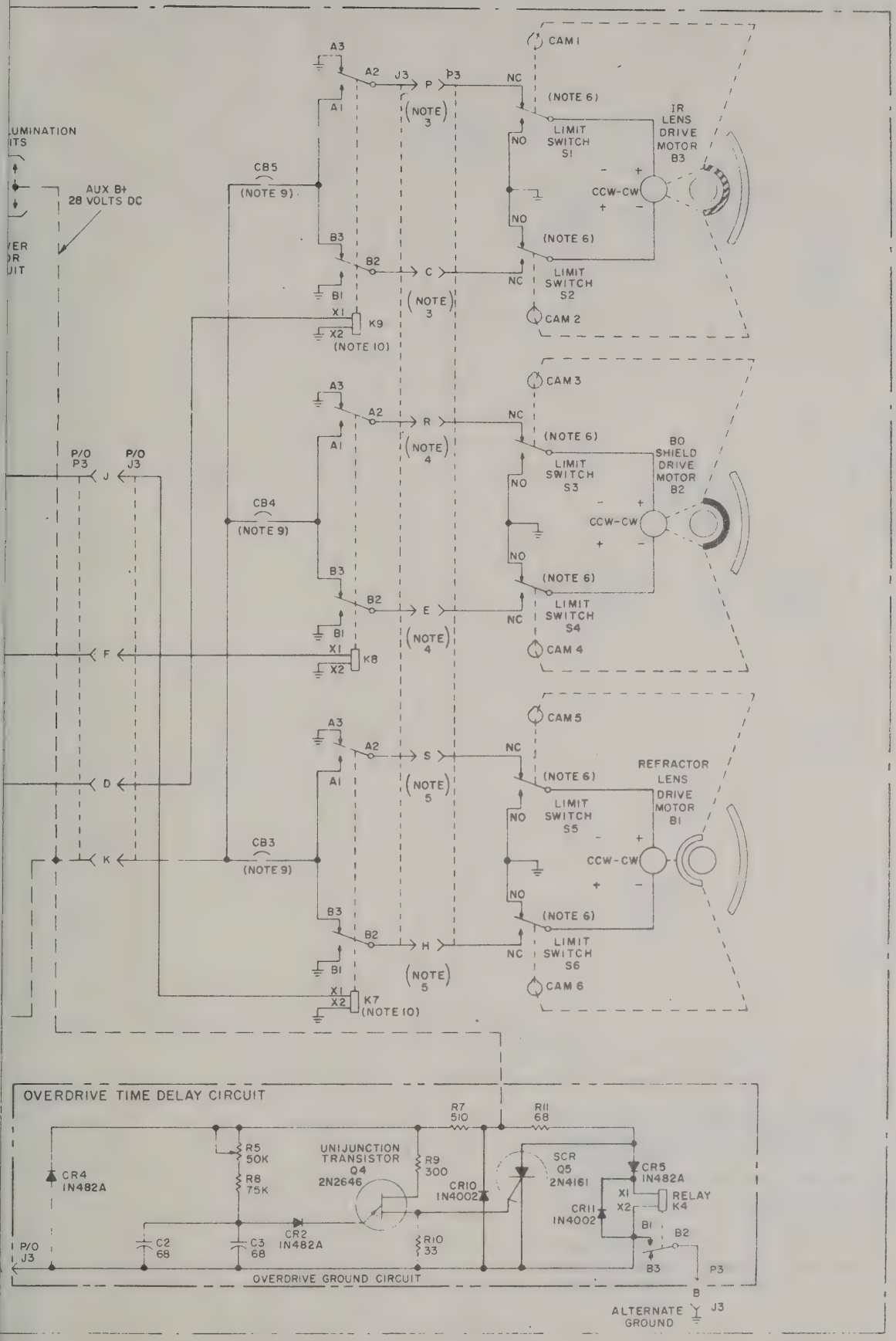
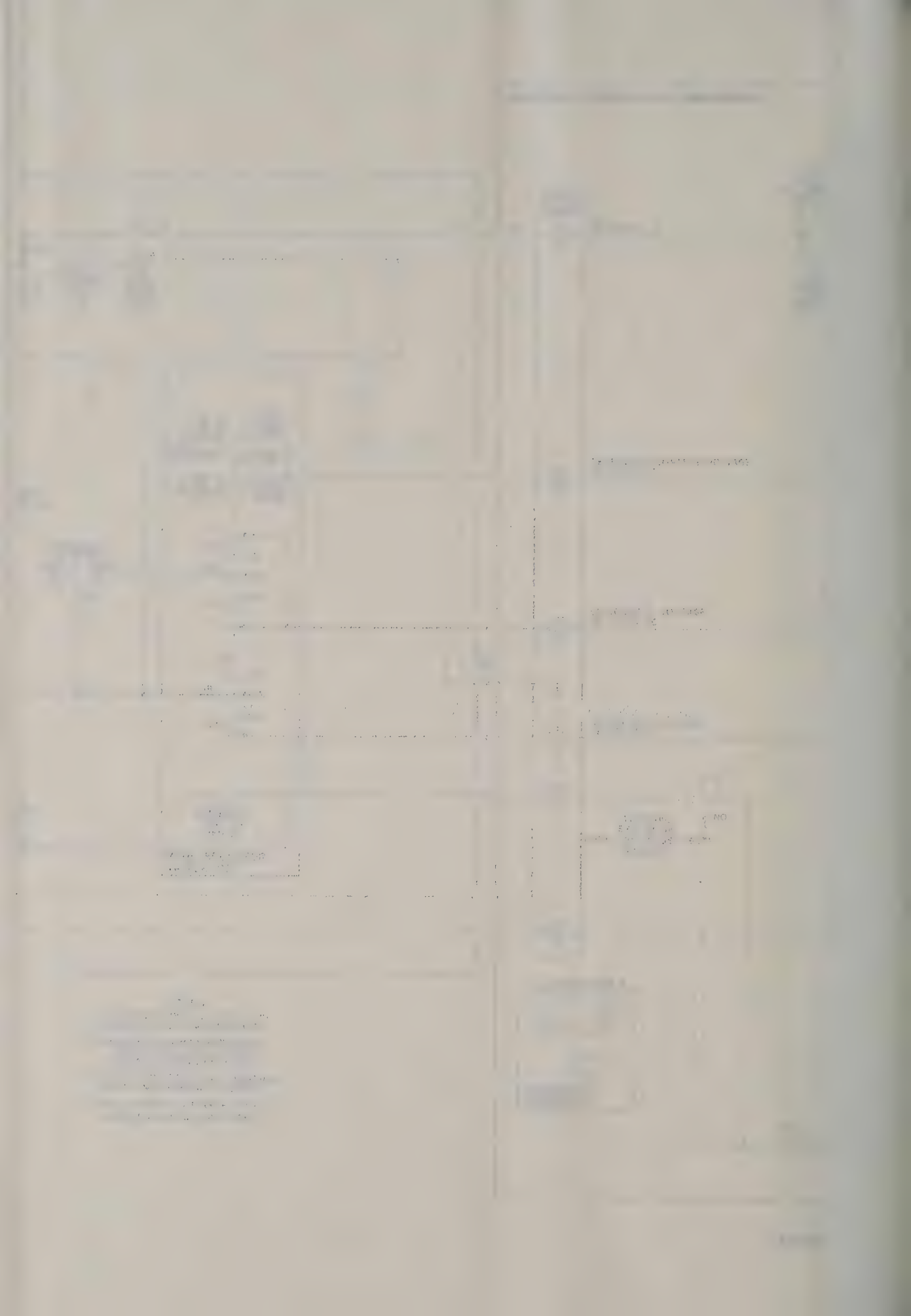
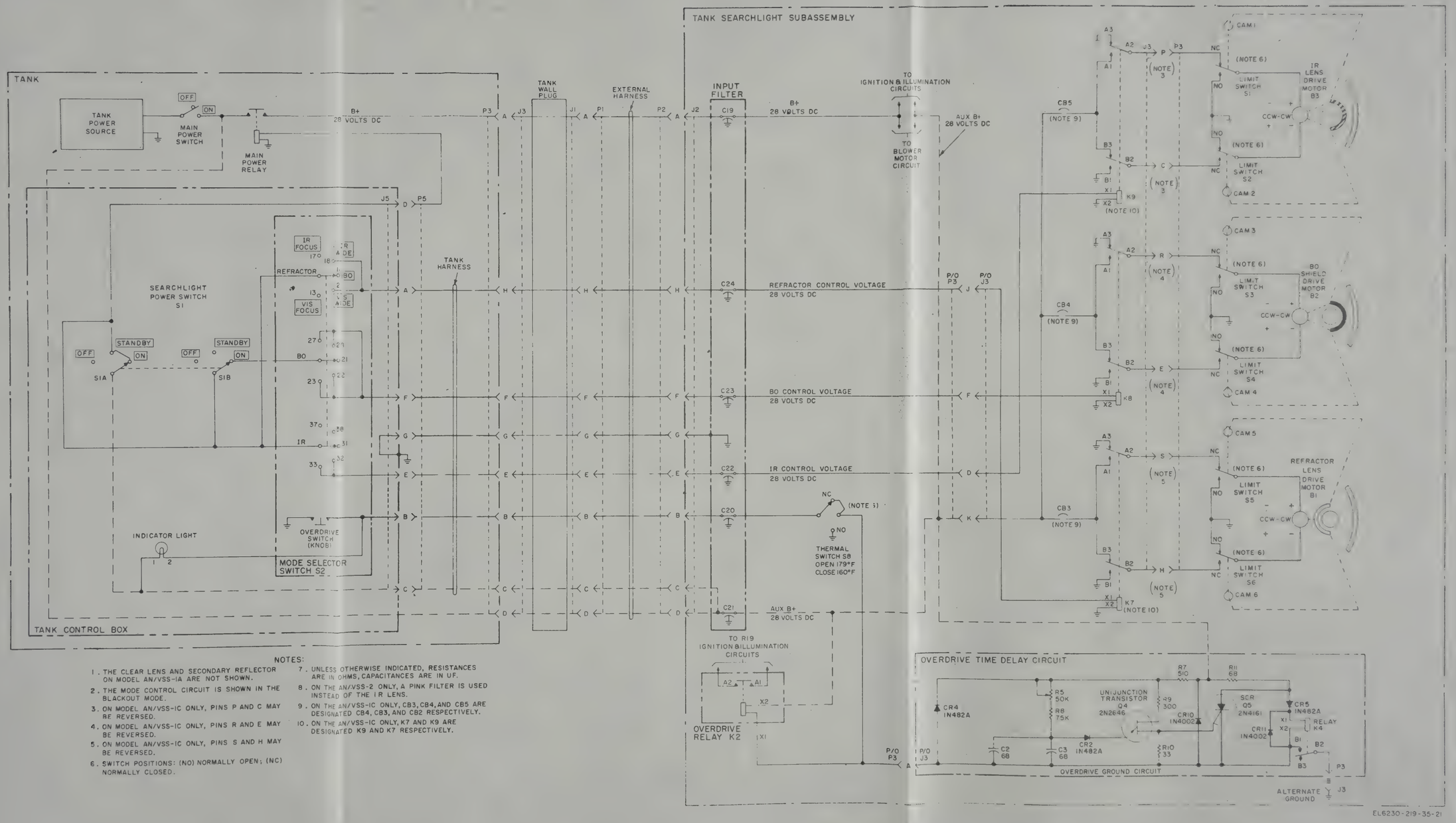


Figure 6–11. AN/GSS–14 and AN/GSS–18, mode control circuits, simplified schematic diagram.



N/VSS—1A through AN/VSS—1E and AN/VSS—2 mode control circuits, simplified schematic diagram.

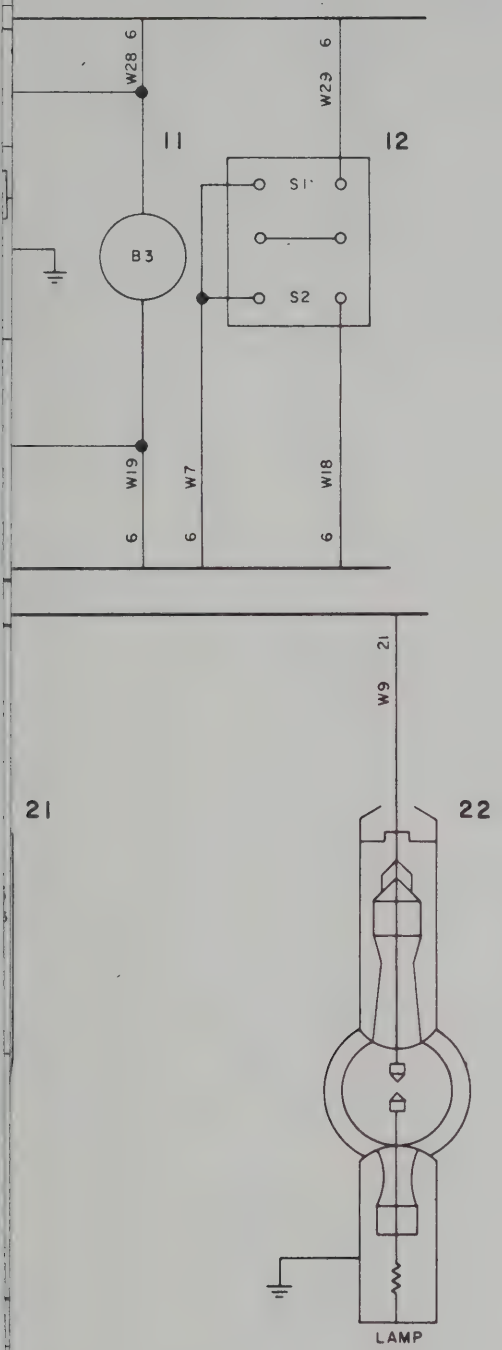




NOTES:

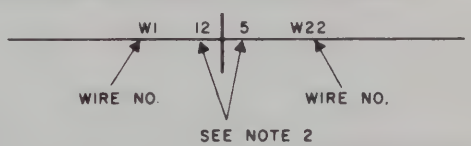
1. THE CLEAR LENS AND SECONDARY REFLECTOR ON MODEL AN/VSS-1A ARE NOT SHOWN.
2. THE MODE CONTROL CIRCUIT IS SHOWN IN THE BLACKOUT MODE.
3. ON MODEL AN/VSS-1C ONLY, PINS P AND C MAY BE REVERSED.
4. ON MODEL AN/VSS-1C ONLY, PINS R AND E MAY BE REVERSED.
5. ON MODEL AN/VSS-1C ONLY, PINS S AND H MAY BE REVERSED.
6. SWITCH POSITIONS: (NO) NORMALLY OPEN; (NC) NORMALLY CLOSED.
7. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UF.
8. ON THE AN/VSS-2 ONLY, A PINK FILTER IS USED INSTEAD OF THE I R LENS.
9. ON THE AN/VSS-1C ONLY, CB3, CB4, AND CB5 ARE DESIGNATED CB4, CB3, AND CB2 RESPECTIVELY.
10. ON THE AN/VSS-1C ONLY, K7 AND K9 ARE DESIGNATED K9 AND K7 RESPECTIVELY.

Figure 6—12. AN/VSS—1A through AN/VSS—1E and AN/VSS—2 mode control circuits, simplified schematic diagram.



NOTES:

1. WIRES ARE ARBITRARILY NUMBERED.
2. THE SMALL NUMBER ON EACH WIRE (ADJACENT TO THE COMMON OR BASELINE) CORRESPONDS TO THE LARGE NUMBER ADJACENT TO THE STATION TO WHICH THE WIRE RUNS.
3. WIRE NUMBER CODING AS INDICATED BELOW:



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gure 6—13. Searchlight, Subassembly MX—7884/VSS—1, wiring diagram.

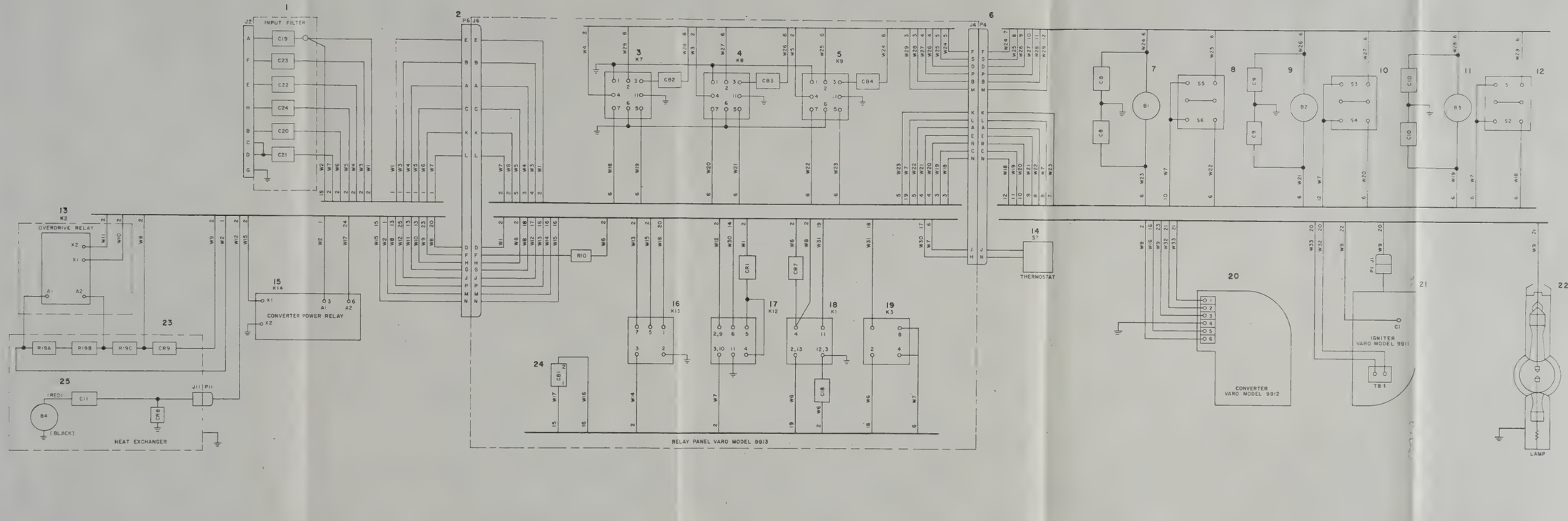
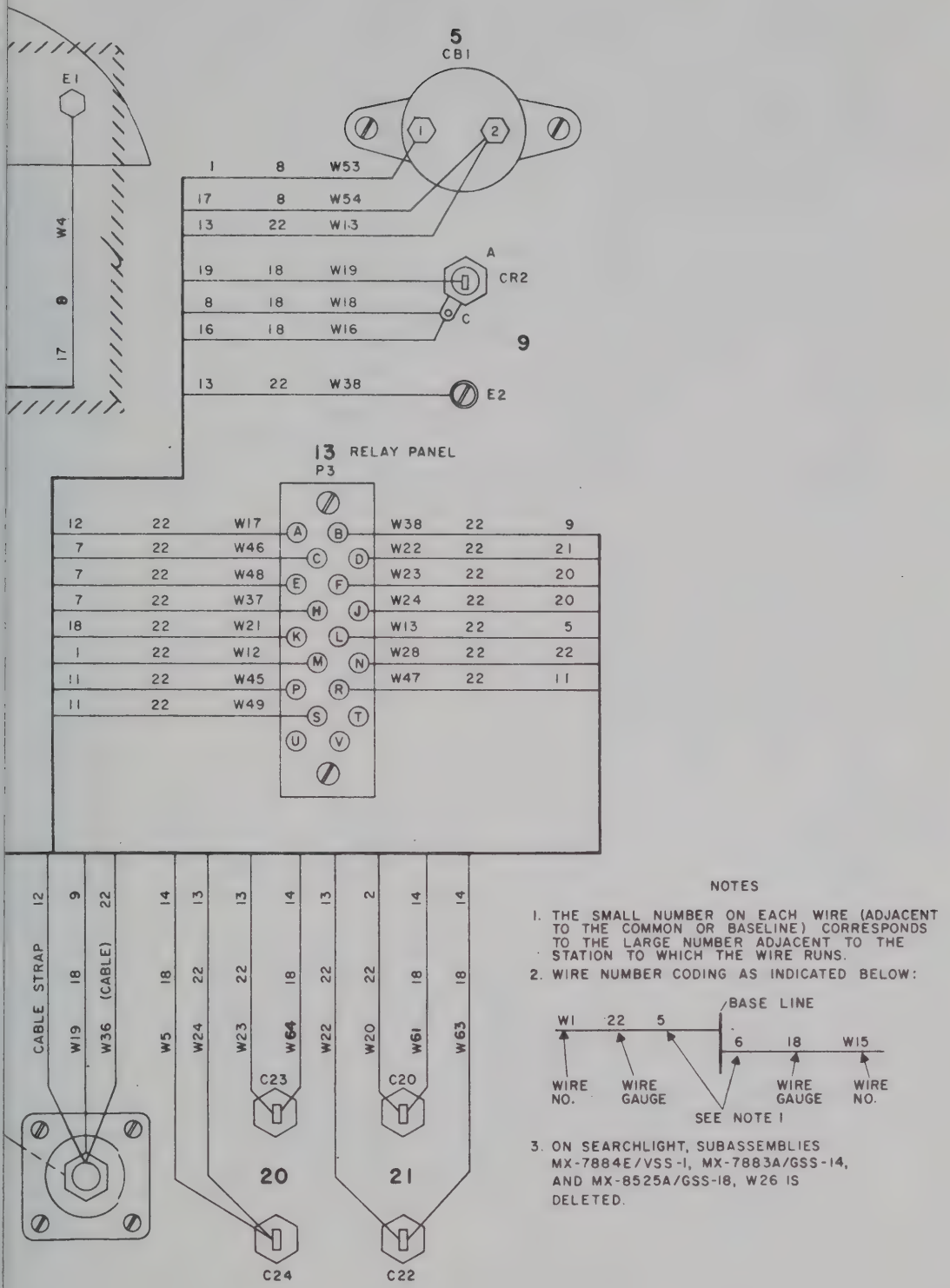


Figure 6-13. Searchlight, Subassembly MX-7884/VSS-1, wiring diagram.



NOTES

1. THE SMALL NUMBER ON EACH WIRE (ADJACENT TO THE COMMON OR BASELINE) CORRESPONDS TO THE LARGE NUMBER ADJACENT TO THE STATION TO WHICH THE WIRE RUNS.
2. WIRE NUMBER CODING AS INDICATED BELOW:

3. ON SEARCHLIGHT, SUBASSEMBLIES MX-7884E/VSS-1, MX-7883A/GSS-14, AND MX-8525A/GSS-18, W26 IS DELETED.

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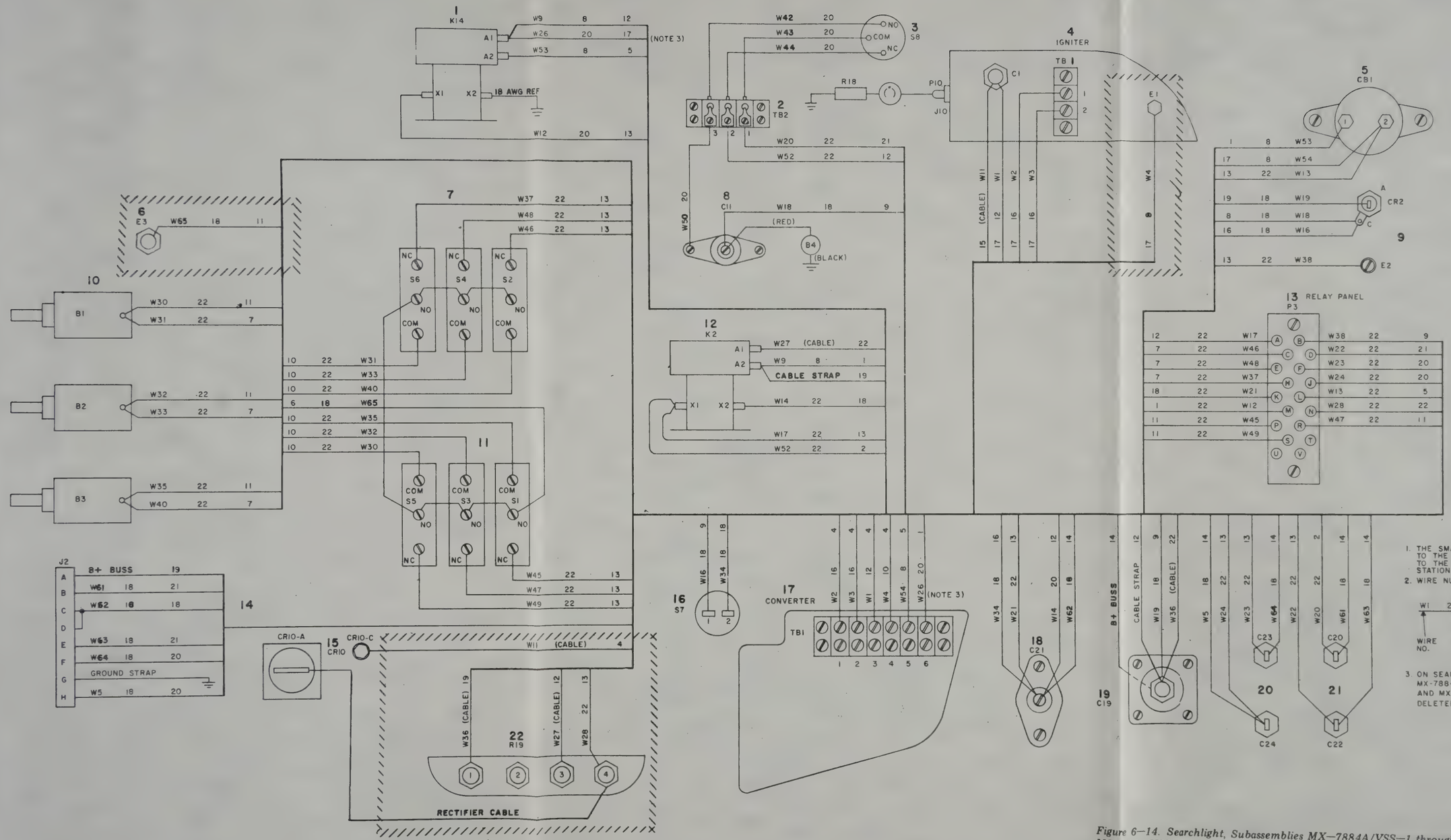
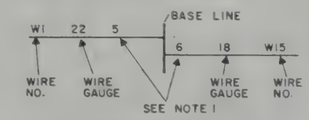
re 6—14. Searchlight, Subassemblies MX—7884A/VSS—1 through MX—7884E/VSS—1, 8004/VSS—2, MX—7883/GSS—14, MX—7883A/GSS—14, MX—8525/GSS—18, and MX—8525A/GSS—18, wiring diagram.



NOTES

1. THE SMALL NUMBER ON EACH WIRE (ADJACENT TO THE COMMON OR BASELINE) CORRESPONDS TO THE LARGE NUMBER ADJACENT TO THE STATION TO WHICH THE WIRE RUNS.
2. WIRE NUMBER CODING AS INDICATED BELOW:



3. ON SEARCHLIGHT, SUBASSEMBLIES MX-7884E/VSS-1, MX-7883A/GSS-14, AND MX-8525A/GSS-18, W26 IS DELETED.

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Figure 6-14. Searchlight, Subassemblies MX-7884A/VSS-1 through MX-7884E/VSS-1, MC-8004/VSS-2, MX-7883/GSS-14, MX-7883A/GSS-14, MX-8525/GSS-18, and MX-8525A/GSS-18, wiring diagram.

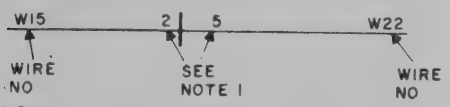
S-14 (NOTE 4)

4

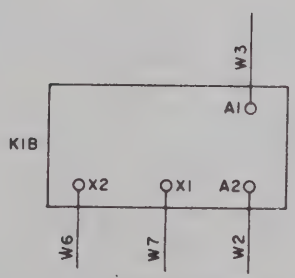
(-) W28

NOTES:

1. THE SMALL NUMBER ON EACH WIRE (ADJACENT TO THE COMMON OR BASELINE) CORRESPONDS TO LARGE NUMBER ADJACENT TO THE STATION TO WHICH THE WIRE RUNS.
2. WIRE CODING IS AS INDICATED BELOW.



3. KIB MAY BE SUBSTITUTED. SEE DIAGRAM BELOW FOR TERMINAL DESIGNATIONS.
4. USED ON AN/GSS-14* AND AN/GSS-18*.
5. USED ON AN/GSS-14A, AN/GSS-14B, AN/GSS-18A, AND AN/GSS-18B



OPTIONAL METHOD
CONTACTOR K1 WITH
DIFFERENT TERMINAL MARKINGS.

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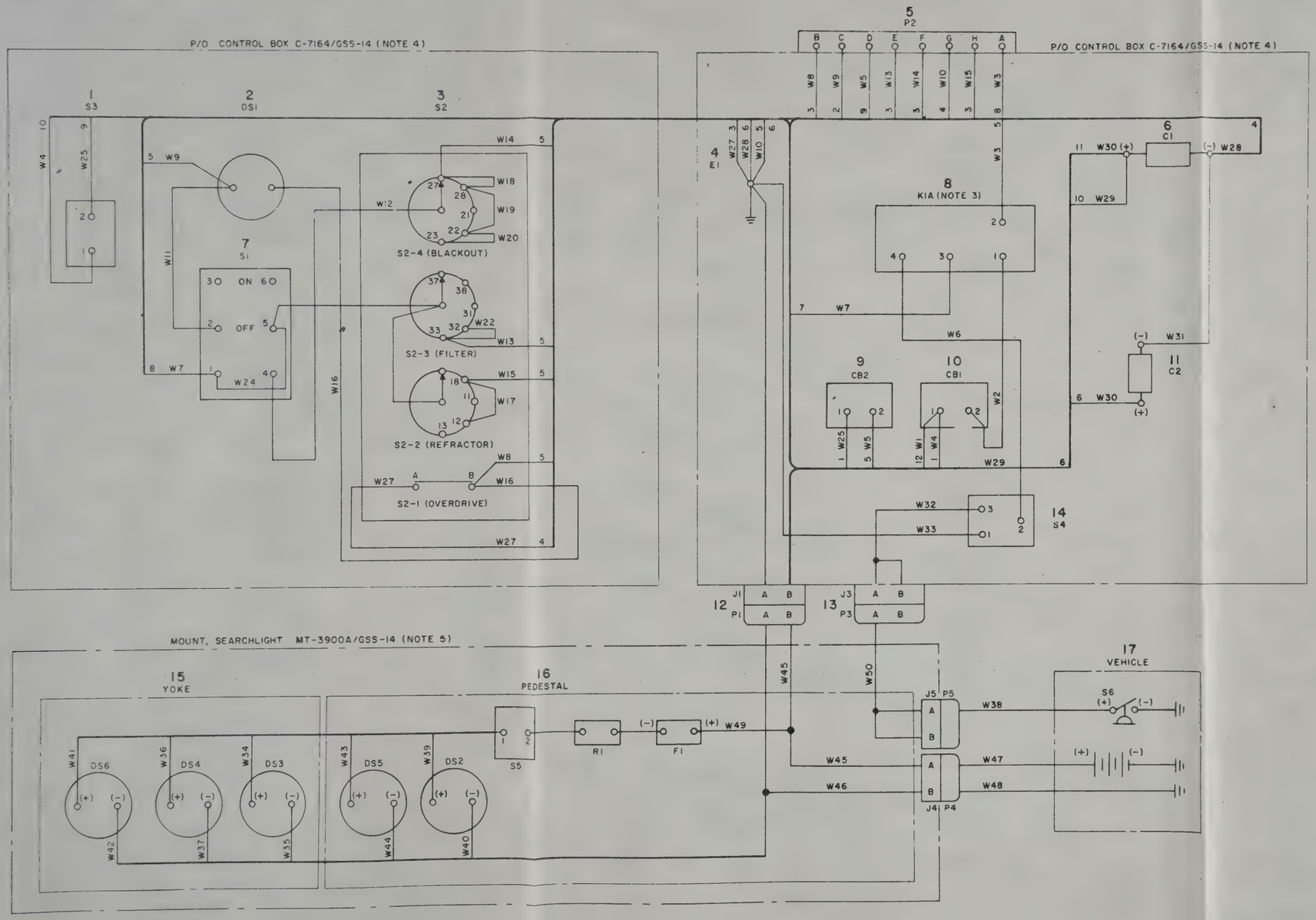
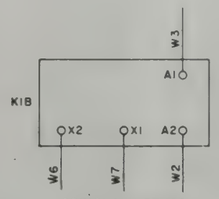
re 6—15. Control Box C—7164/GSS—14 and Mount MT—3900A/GSS—14, wiring diagram.



NOTES

1. THE SMALL NUMBER ON EACH WIRE (ADJACENT TO THE COMMON OR BASELINE) CORRESPONDS TO LARGE NUMBER ADJACENT TO THE STATION TO WHICH THE WIRE RUNS.
2. WIRE CODING IS AS INDICATED BELOW.

3. K1B MAY BE SUBSTITUTED. SEE DIAGRAM BELOW FOR TERMINAL DESIGNATIONS.
4. USED ON AN/GSS-14* AND AN/GSS-18*
5. USED ON AN/GSS-14A, AN/GSS-14B, AN/GSS-18A, AND AN/GSS-18B



OPTIONAL METHOD CONTACTOR K1 WITH DIFFERENT TERMINAL MARKINGS.

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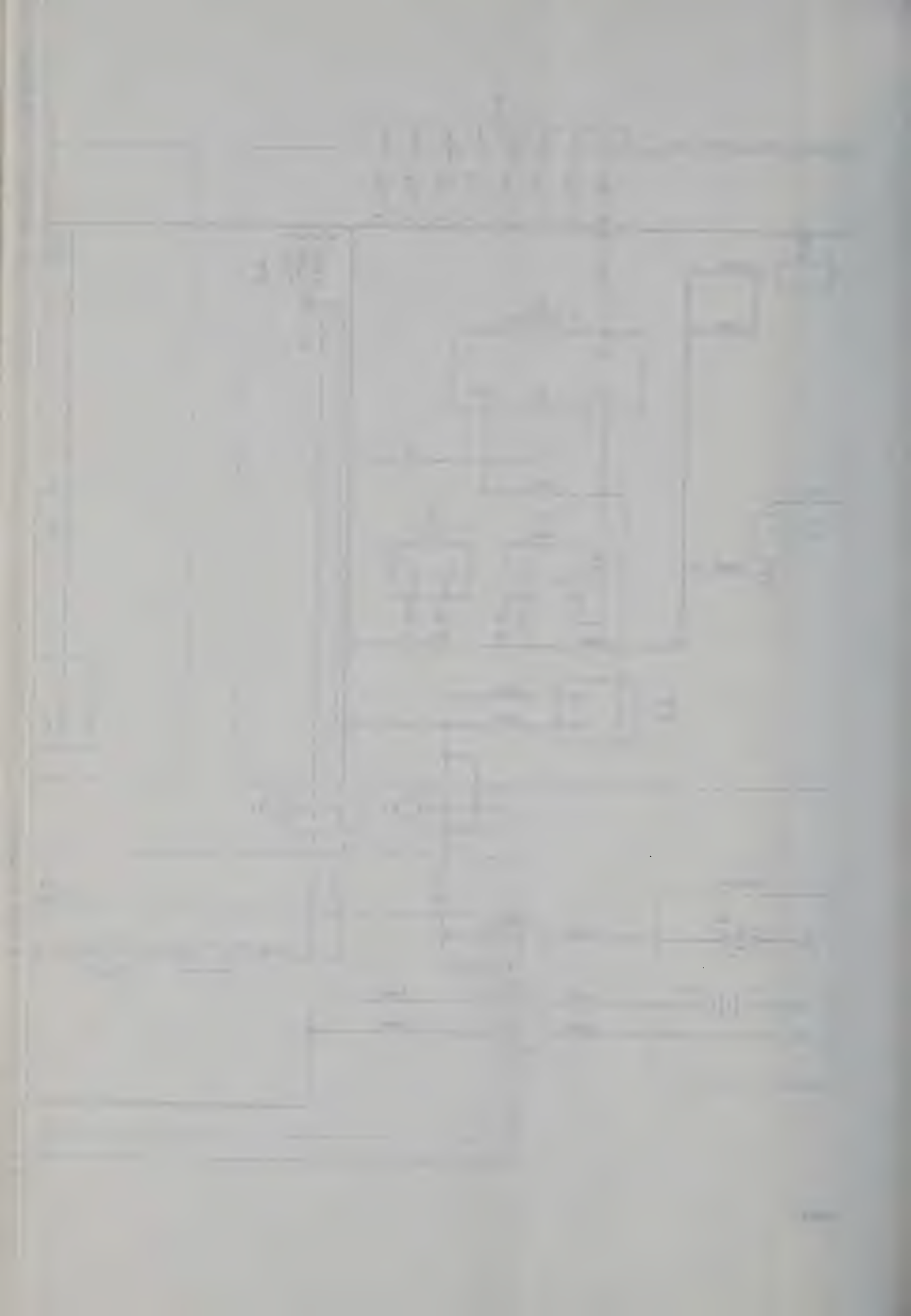
Figure 6-15. Control Box C-7164/GSS-14 and Mount MT-3900A/GSS-14, wiring diagram.



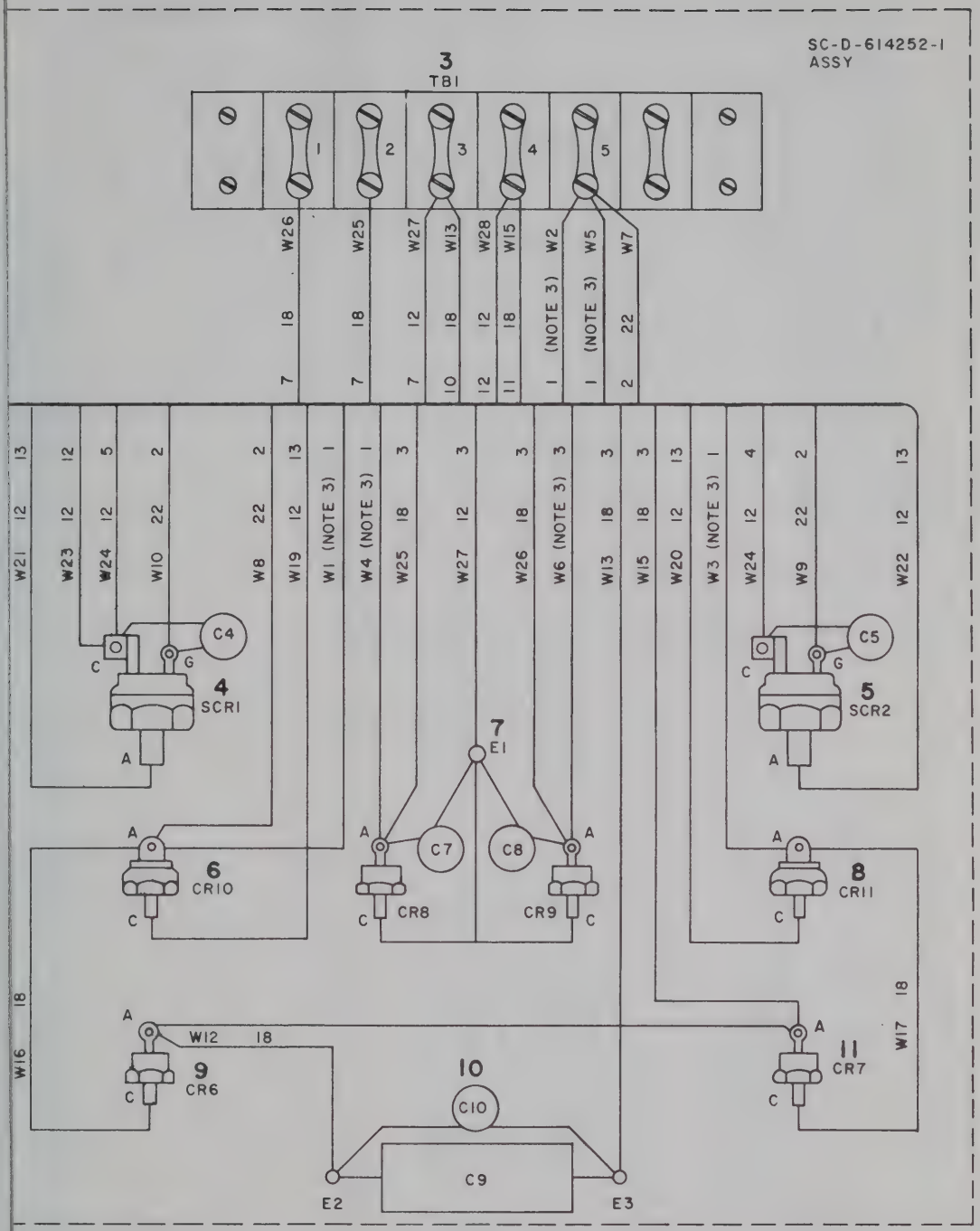


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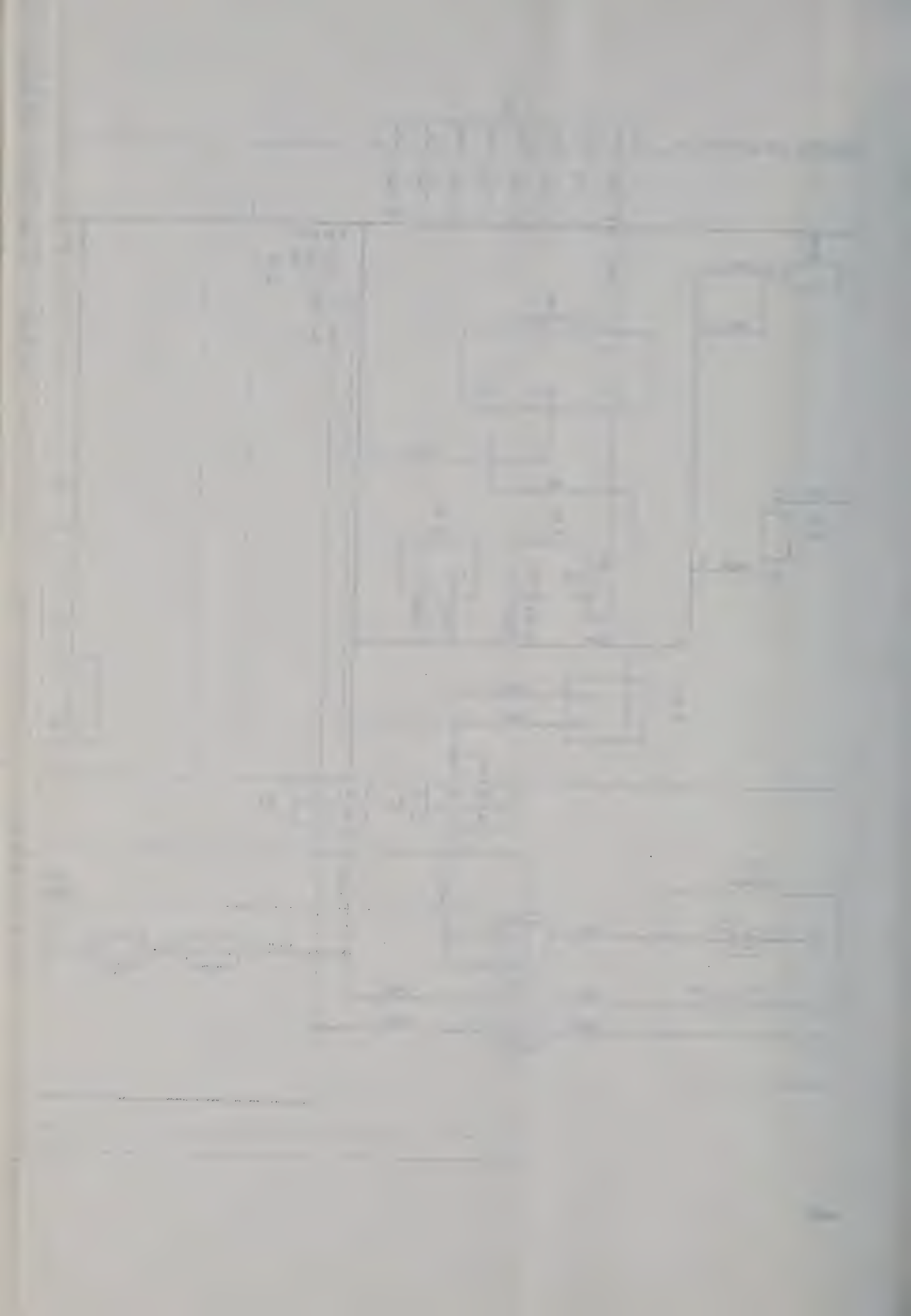
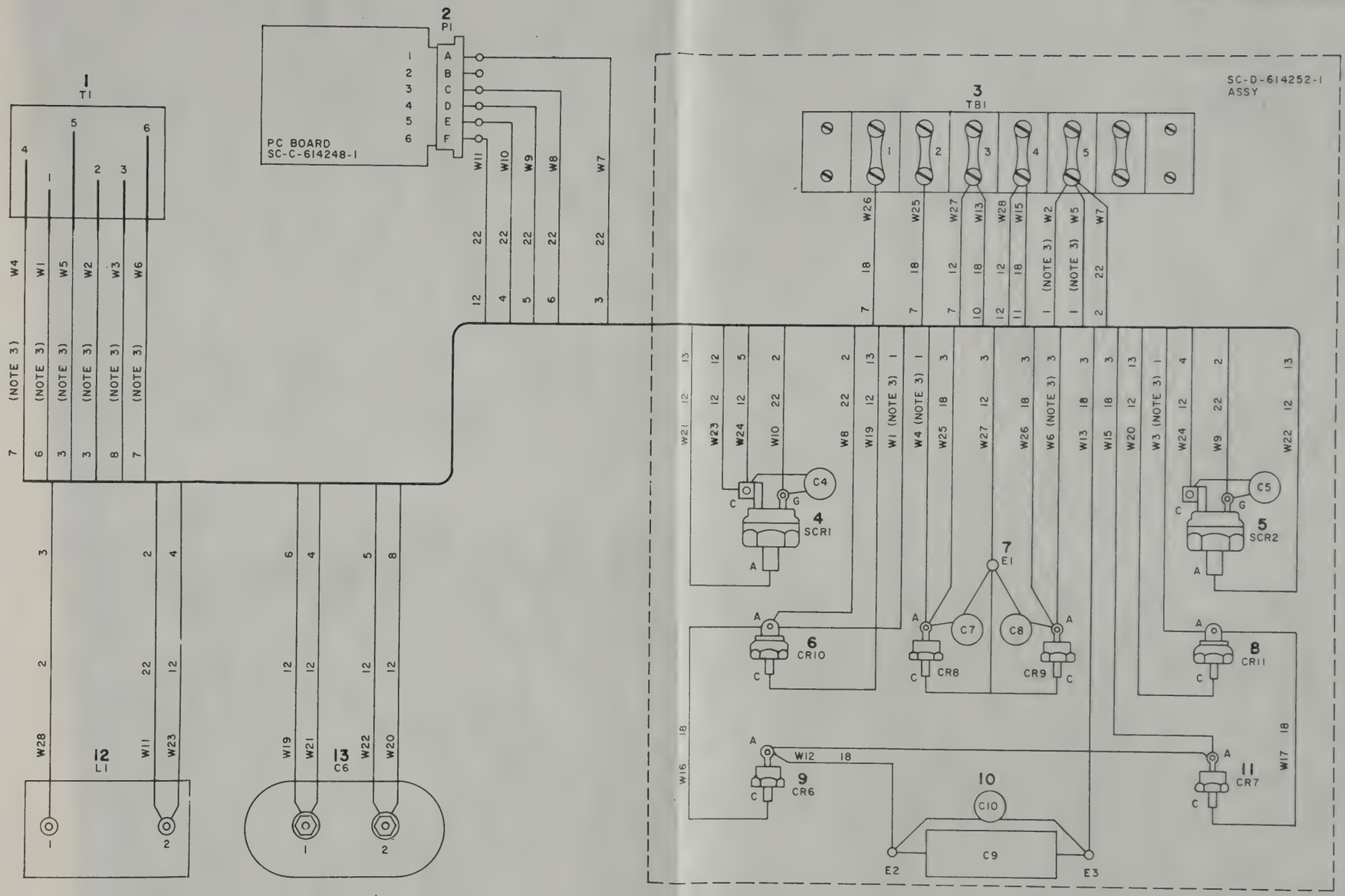
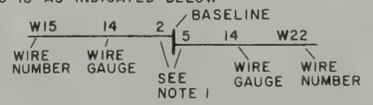
Figure 6—16. Converter assembly (Varo model 9948), wiring diagram.





NOTES

1. THE SMALL NUMBER ON EACH WIRE (ADJACENT TO THE COMMON OR BASELINE) CORRESPONDS TO THE LARGE NUMBER ADJACENT TO THE STATION TO WHICH THE WIRE RUNS
2. WIRE NUMBER CODING IS AS INDICATED BELOW



3. WIRE SUPPLIED WITH T1 AND TERMINATED INTERNALLY

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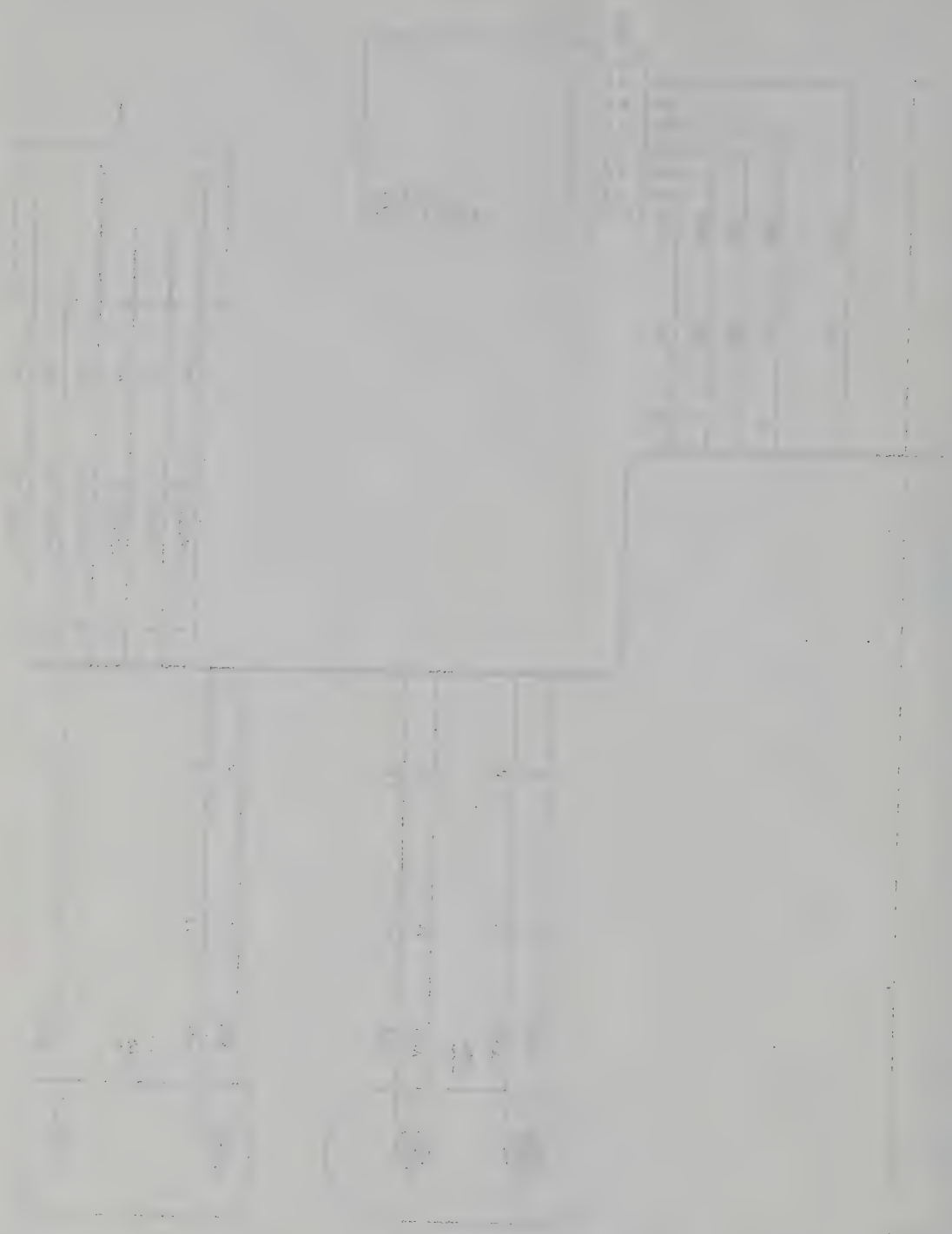
Figure 6—16. Converter assembly (Varo model 9948), wiring diagram.

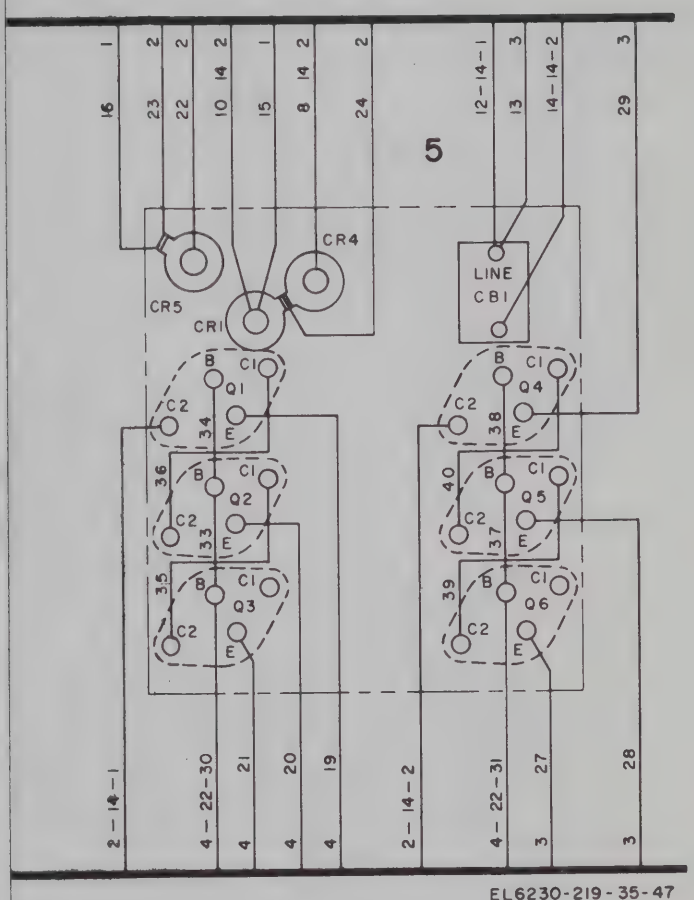


CENT TO THE COMMON OR BASE LINE)
CENT TO THE STATION TO WHICH THE WIRE RUNS.
18 GAGE, ELECTRICAL., INSULATED WHITE.
ALED COPPER WIRING.

TH ELECTRICAL POLYTETRAFLUOROETHYLENE

OW:

NO.



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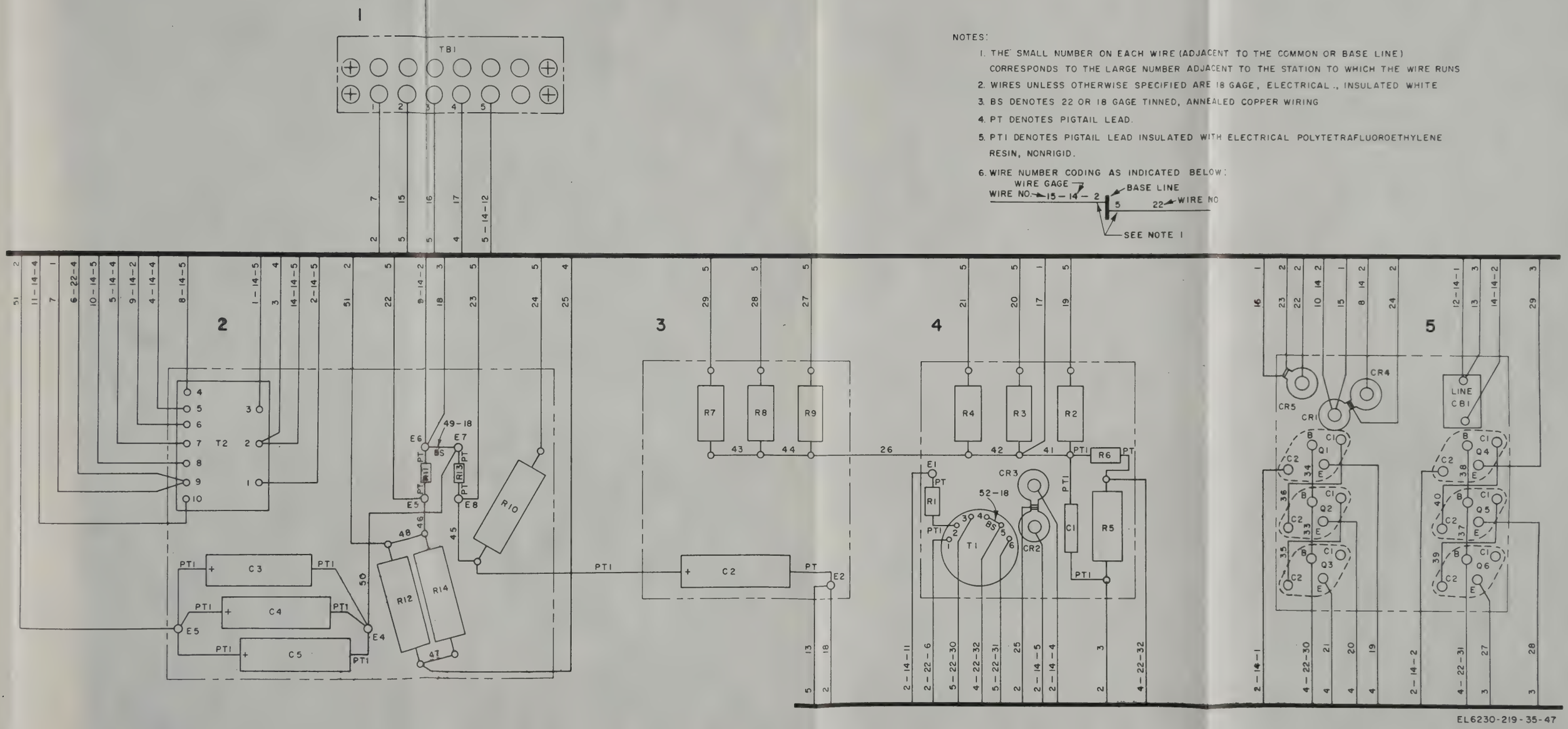
(ITT model 6484), wiring diagram.

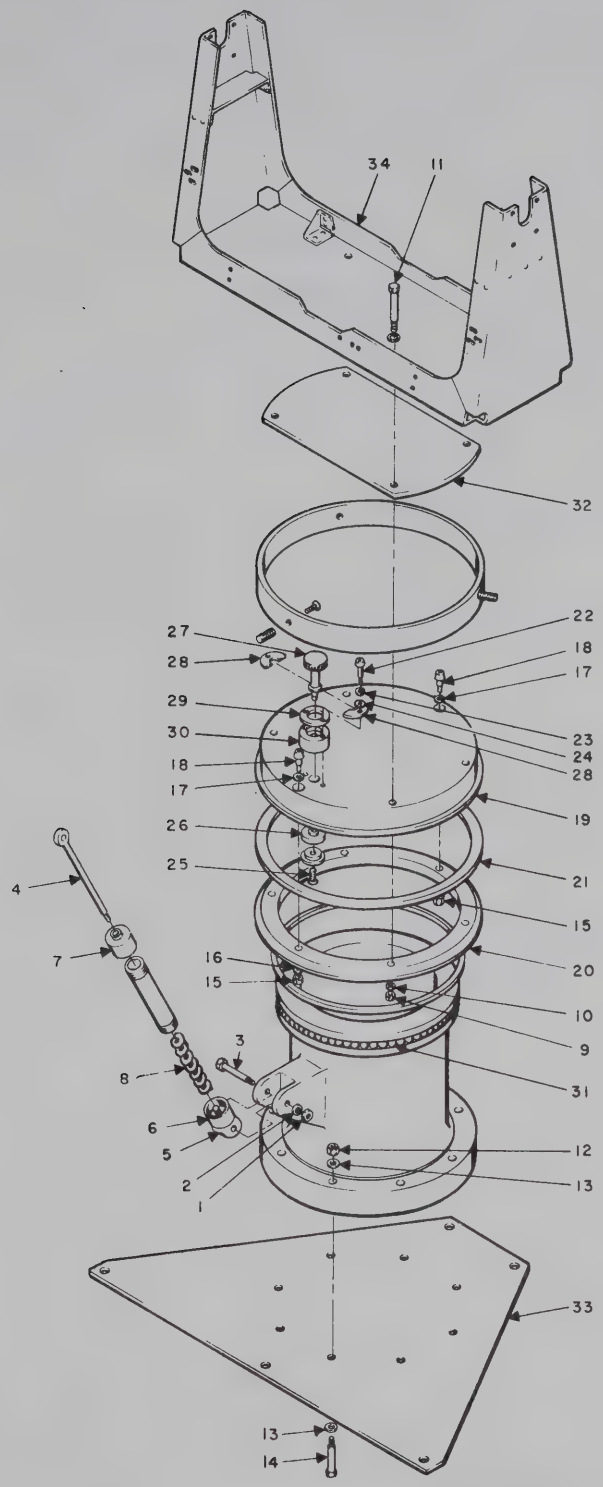


NOTES:

1. THE SMALL NUMBER ON EACH WIRE (ADJACENT TO THE COMMON OR BASE LINE) CORRESPONDS TO THE LARGE NUMBER ADJACENT TO THE STATION TO WHICH THE WIRE RUNS
2. WIRES UNLESS OTHERWISE SPECIFIED ARE 18 GAGE, ELECTRICAL., INSULATED WHITE
3. BS DENOTES 22 OR 18 GAGE TINNED, ANNEALED COPPER WIRING
4. PT DENOTES PIGTAIL LEAD.
5. PTI DENOTES PIGTAIL LEAD INSULATED WITH ELECTRICAL POLYTETRAFLUOROETHYLENE RESIN, NONRIGID.
6. WIRE NUMBER CODING AS INDICATED BELOW:

Figure 6—17. Converter assembly (ITT model 6484), wiring diagram.

EL6230-219-35-47



1 Nut 19A1H7
2 Washer 19A1H8
3 Bolt 19H6
4 Shaft 19A1MP2
5 Shaft bearing 19A2A4MP1
6 Bottom cap 19A1MP4
7 Top cap 19A1MP1
8 Spring 19A1MP5
9 Nut (4) 19A1H7
10 Washer (4) 19A1H8
11 Bolt (4) 19H11
12 Nut (14) 19A1H7
13 Washer (14) 19A3H13
14 Cap screw (14) 19H6
15 Nut (2) 19A1H7
16 Washer (2) 19A1H8
17 Washer (2) 19A1H8
18 Cap screw (2) 19A3A9
19 Upper race 19A3MP6
20 Lower race 19A3MP10
21 Felt seal 19A3MP9
22 Screw (2) 19A3H1
23 Split washer (2) H3
24 Washer (2) H29
25 Bolt 19A3H12
26 Brake shoe 19A3MP8
27 Brake knob 19A3MP2
28 Retaining cap 19A3MP1
29 Brake shim 19A3MP13
30 Brake guide 19A3MP3
31 Ball bearings 19A3MP11 and MP12
32 Rubber pad 19MP6
33 Mounting plate 19A3MP16
34 Yoke 19A2
35 Washer
36 Bolt 19H6

Figure 6—18. Mount, Universal MT—3900/GSS—14, exploded view.

APPENDIX

REFERENCES

Following is a list of references applicable and available to the field and depot maintenance repairman of 2.2-kw, 23-inch xenon searchlight.

DA Pam 310—4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310—7	Index of Modification Work Orders.
SB 11—604	Replacement of Tool Kits, Radar and Radio Repairman TK—87/U and TK—88/U with Tool Kits, Electronic Equipment TK—105/G and TK—100/G.
TM 5—764	Electric Motor and Generator Repair.
TM 11—483	Radio Interference Suppression.
TM 11—2300—351—15—3	Organizational, DS, GS, and Depot Maintenance Manual: Installation of Kit: Universal Mounting, Searchlight, Xenon, 2.2-Kw, 28-Volt DC for Truck, Utility, 1/4-Ton, 4-by-4, M—151.
TM 11—6130—243—12	Organizational Maintenance Manual: Power Supply PP—4606/G.
TM 11—6625—366—15	Organizational, DS, GS, and Depot Maintenance Manual: Multimeter TS—352B/U.
TM 11—6625—1580—12	Organizational Maintenance Manual: Test Set, Searchlight AN/GSM—182.
TM 11—6230—219—12	Organizational Maintenance Manual Including Repair Parts and Special Tools List: 2.2-Kw, 23-Inch Xenon Searchlight.

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  29—134

NG: None

USAR: None

For explanation of abbreviations used, see AR 310—50.

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